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SECTION 01025

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 LUMP SUM PAYMENT ITEMS

1.1.1 General

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.1.2 Lump Sum Item

a. "Site Work" [Item No. 0001]

(1) Payment will be made for costs associated with Site Work including mobilization and demobilization, construction general conditions, and all other work necessary to provide a completed project as defined in contract drawings and as specified in SECTION 02468 DRILLED FOUNDATION CAISSONS, SECTION 02821 FENCING, SECTION 3200 CONCRETE REINFORCEMENT, SECTION 03307 CONCRETE FOR MINOR STRUCTURES, SECTION 05090 WELDING, STRUCTURAL, SECTION 05120 STRUCTURAL STEEL AND SECTION 05500 MISCELLANEOUS METAL.

(2) Unit of measure: Lump Sum.

b. "Electrical Work" [Item No. 0002]

(1) Payment will be made for costs associated with electrical work as defined in contract drawings and as specified in SECTION 16311 MAIN ELECTRIC SUPPLY STATION AND SUBSTATION, SECTION 16370 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL AND SECTION 16375 ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND.

(2) Unit of measure: Lump Sum.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

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SECTION 01100

SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. GOVERNMENT CODE OF FEDERAL REGULATIONS (CFR)

33 CFR 320-330

General Regulatory Policies, Permits,
Enforcement and Definitions

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan

Contractor shall provide an accident prevention plan including an activity hazard analysis to the Contracting Officer within 15 calendar days after receipt of award. Plan shall be in accordance with Contract Clause entitled "ACCIDENT PREVENTION (NOV 1991) - ALTERNATE 1.

Payrolls and Basic Records

Contractor shall submit payrolls and basic records in accordance with the CLAUSE entitled "PAYROLLS AND BASIC RECORDS (FEB 1988)".

Progress Chart; G-AOF

Contractor shall submit progress chart in accordance with the Contract clause entitled "SCHEDULE FOR CONSTRUCTION CONTRACTS (APR 1984)".

Non-listed, Non-Commercially Active Stone or Material Source; G-ECD.

If after award of a contract, the Contractor proposes to furnish stone, or granular materials from non-listed, or non-commercially active sources, the following information and data for each non-listed or non-commercially active source of stone, or granular material shall be furnished forty-five (45) or more calendar days prior to the date the Contractor is scheduled to obtain materials from such source(s).

- a. Name and address (Property Owner).
- b. Location, site map, and legal description (or appropriate

substitute) of the area.

c. Previous land use information.

d. A topographic map of the area.

e. Photographs showing the area proposed for use.

f. Written permission of the owners of the proposed non-listed or non-commercially active sources(s).

g. Written permission of the owners of the access properties involved.

h. All data required to assess potential environmental impacts. This information is required in order to determine the necessity for environmental documentation for any non-commercially active, non-listed source(s).

i. Documentation of coordination of the use of proposed non-commercially active, non-listed source(s) with Federal, State and local agencies having an interest and furnish written approval of these agencies for use of such source(s).

(1) Field Supervisor, U.S. Fish and Wildlife Service, Ecological Services, 2651 Coolidge Road, East Lansing, Michigan 48823. Phone: 517-351-2555.

(2) Chief, Office of Strategic Environmental Analysis, B 19J,, U.S. Environmental Protection Agency, 77 West Jackson Blvd., Chicago, Illinois 60604-3590.

(3) Chief, Land and Water Mgmt. Division, Michigan Department of Environmental Quality, P. O. Box 30458, Lansing, Michigan 48909.

(4) State Historic Preservation Officer, Michigan Bureau of History, 717 W. Allegan, Lansing, Michigan 48918-1800.

j. The proposed reduction, if any, in the applicable unit or lump-sum prices the BIDDING SCHEDULE if the request were to be approved by the Government.

Survey Note Format; G-AOF.

Submit the proposed survey note format prior to performing any survey work at the work site.

Video Cassettes; G-AOF.

Prior to the start of work, video recordings shall be delivered within seven (7) calendar days.

SD-07 Certificates

As-Built Technician's Qualifications

Submit the identity and qualifications of the persons assigned to prepare

the as-built information at least 10 calendar days in advance of preparing the drawings.

As-built Drawings; G-AOF.

Within ten (10) calendar days after the substantial completion date as established by the Contracting Officer, submit the as-built details of the work performed under this contract on a set of blue-line prints of the contract drawings marked in red. Following review and approval by the Government, the Contractor shall prepare electronic and mylar copies of as-built drawings for submittal within 15 calendar days following receipt of comments from the Government. Electronic files shall be submitted in Microstation 95 (.dgn) CADD file format, suitable for plotting with Intergraph IPLOT Software. The electronic medium for file transfers shall be agreed to prior to the time of submittal and shall be compatible with current industry standards and hardware configurations.

Survey Information

Upon completion of the contract work, the originals of all field notes, sketches, recordings and computations made by the Contractor in performing the layout work shall be submitted in ring binders.

1.3 REGULATORY REQUIREMENTS

1.3.1 Additional Work Proposed and Not Authorized

1.3.1.1 Work Subject to 33 CFR 320-330

Any additional work (not specifically shown on the plans or delineated in the specifications) proposed by the Contractor in or affecting navigable waters, including wetlands (as defined in 33 CFR 320-330, published in the Federal Register Vol.51, No. 219, Thursday, November 13, 1986) shall not be performed without a Department of the Army Permit. This requirement shall be applicable to all work, permanent or temporary, and/or fill(s). The Department of the Army Permit shall be approved by the District Engineer or Deputy District Engineer in accordance with the laws of the United States and the regulations promulgated thereunder, including, but not limited to, the River and Harbor Act of 1899, the Clean Water Act and the National Environmental Policy Act of 1969, as amended. Corps employees (Contracting Officer's Representatives (COR) or inspectors) are not delegated authority to authorize such work. Information on making application for such permit(s) may be obtained by contacting one of the offices as listed hereinafter. When applying for information or a permit, a copy of any correspondence should be directed to the Contracting Officer of this contract. If a permit is not obtained, the additional work cannot be accomplished. Any delay in processing the permit will not constitute the basis of a claim under this contract. The fact that the Contractor is performing work under a Department of the Army Contract will give the Contractor no greater rights than any other applicant for a Department of the Army Permit.

MICHIGAN-INDIANA

Regulatory Branch
Engineering and Technical Services Division
U.S. Army Engineer District, Detroit
P. O. Box 1027
Detroit, MI 48231

Telephone: 313-226-6813

1.4 PROJECT/SITE CONDITIONS

1.4.1 Condition and Use of Project Site

The drawings indicate soundings and elevations at the project site as found in condition surveys made as stated on the contract drawings. A notification of at least five (5) calendar days shall be given to the Contracting Officer prior to bringing any construction equipment or material upon the work site. The Contractor shall be responsible for damages that may be suffered due to its operations. The Contractor shall note CLAUSE titled "PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS."

1.4.1.1 Physical Conditions

The physical conditions shown on the drawings are indicative of those that prevailed at the time of the site investigations and may be different than those at the time of construction. Significant variations that would require changes to the plans or specification shall be reported to the Contracting Officer immediately. The information shown on the logs of soil borings on the contract drawings is from borings located within or near the work areas. While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, localized variations of characteristics of the subsurface materials of this region are anticipated. Field logs of borings taken in the project area, soil samples, and other subsurface information obtained or prepared for this contract are available for examination upon request at the Engineering & Construction Division, Design Branch, U.S. Army Corps of Engineers, Detroit District, 477 Michigan Avenue, Detroit, MI 48226.

1.4.1.2 Work and Storage Areas

Work and storage areas will be provided at the site and will be as designated and/or approved by the Contracting Officer. Areas made available to the Contractor will be selected to minimize interference with Government operations and other contractors.

1.4.2 Existing Vegetation, Structures, Equipment, Utilities & Improvements

General locations of applicable existing utilities, vegetation, structures, equipment and improvements, based upon latest information available to the Government have been shown on the drawings. However, it is the Contractor's obligation to establish the exact horizontal and vertical location and size of all existing utility lines which are located within the required work area. The Contractor shall submit a utility locating plan for locating existing utilities and a copy of its utility location findings prior to commencing work on the site. Any utility lines which are not found by the Contractor, but which are known to exist at the project site, shall be reported to the Contracting Officer immediately. The Contracting Officer will have the option of directing commencement of work at the site or requiring the Contractor to submit further plans for locating the utility lines. Once the utilities have been located and marked, the Contractor shall be deemed to have the location made known to it pursuant to CLAUSE titled "PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS." If the Contractor damages any existing utility line, vegetation, structure, equipment or improvement, a report thereof shall be made immediately to the Contracting

Officer. In any event, existing utility lines, vegetation, structures, equipment or improvements shall be protected from damage, and if damaged, shall be repaired by the Contractor at its own expense.

1.4.3 Vehicular Access

Throughout the period of work on this contract, the Contractor shall maintain an all-weather roadway through or around its work area when work therein would otherwise block an existing roadway. Such permanent or temporary roadways shall be kept open for use by emergency vehicles, as well as residential and commercial traffic at all times.

1.4.4 Utility Services

1.4.4.1 Contractor-Furnished Utility Services

The Government shall furnish electrical power at the site from available power sources. The Contractor shall furnish all wiring, switches, fixtures and other means, as required, to utilize electrical power for construction. The Contractor shall furnish sanitary and water and sewer services and other utilities required for its use.

1.4.5 Protection and Maintenance of Traffic

1.4.5.1 Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic. The method of dust control shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads shall be removed unless otherwise approved by the Contracting Officer. Any dirt or mud which is tracked onto paved or surfaced roadways shall be promptly cleaned away.

1.4.5.2 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe and public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.4.6 Contract Supervision and Representation

The Contractor's local representative shall be available to Government representatives during duty hours, 8 a.m. to 4:30 p.m., on normal working days and shall be available by telephone at other times. The name of the Contractor's representative and the contact telephone number shall be furnished to the Government.

1.4.7 Layout of Work and Surveys

1.4.7.1 Layout of Work

The following requirements are in addition to the requirements of CLAUSE titled "LAYOUT OF WORK." The Government has established bench marks and horizontal control points at the site of the work. Horizontal control points and descriptions of bench marks are shown on the drawings and on sheets enclosed in SECTION 01999. The elevations of bench marks are referred to mean water level (IGLD 1955).

1.4.7.2 Surveyor Requirements

From these control points and bench marks, the Contractor shall lay out the work by establishing all lines, grades, range markers and gauges at the site as necessary to control the work. All survey information shall be recorded in accordance with standard and approved methods and in the survey note format approved by the Contracting Officer. All field notes, sketches, recordings and computations made by the Contractor in performing the layout work shall be available at all times during the progress of the work for ready examination by the Contracting Officer or his or her duly authorized representative and upon completion of the contract work the originals shall be turned over to the Contracting Officer in ring binders.

1.4.7.3 Suspension

The Contracting Officer may require that work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking the work. Such suspension will be withdrawn upon satisfactory replacement of location and limit marks. Such suspension shall be at no additional cost to the Government and shall not entitle the Contractor to an extension of time for completing the work.

1.4.7.4 Verification

The Government may make checks as the work progresses to verify lines and grades established by the Contractor and to determine the conformance of the completed work as it progresses with the requirements of contract specifications and drawings. Such checking by the Contracting Officer or his or her representative shall not relieve the Contractor of its responsibility to perform all work in accordance with the contract drawings and specifications and the lines and grades given therein.

1.5 SEQUENCING AND SCHEDULING

1.5.1 Construction Period Restriction

The Contractor shall coordinate with the Owner and Power Company on scheduling, permits, approvals, ordering materials, equipment and scheduling powering of equipment and wiring and its installation at the site, so that the work can proceed without delay. The Contractor shall not interfere with the Owner or Power Company's use of the site or its equipment, or servicing of its equipment, during the contract, except as specified.

1.5.2 Sunday, Holiday' Night and Extended Hours of Operations

When the Contractor elects to work more than 8 hours per day, Monday

through Friday or on Saturdays, Sundays, holidays or nights when not prohibited herein, notice of its intention to do so shall be given to the Contracting Officer not less than forty-eight (48) hours in advance thereof. Adequate lighting for thorough inspection of night operations shall be provided by the Contractor at its expense.

1.5.3 Work Period Restrictions

No work is allowed at the project sites during the following periods:

c. Holiday periods as follows:

- (1) 6 p.m. 28 May to 6 a.m. 1 June 2004
- (2) 6 p.m. 2 July to 6 a.m. 6 July 2004
- (3) 6 p.m. 3 September to 6 a.m. 7 September 2004
- (4) 6 p.m. 24 November to 6 a.m. 29 November 2004
- (5) 6 p.m. 23 December to 6 a.m. 3 January 2005
- (6) 6 p.m. 27 May to 6 a.m. 31 May 2005
- (7) 6 p.m. 1 July to 6 a.m. 5 July 2005
- (8) 6 p.m. 2 September to 6 a.m. 6 September 2005
- (9) 6 p.m. 23 November to 6 a.m. 28 November 2005

The above-stated no-work periods, as applicable, are included in the number of calendar days within which the Contractor is required to complete the work as established in CLAUSE titled "COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK" and therefore the above-stated no-work periods will not entitle the Contractor to additional time for completing the work.

1.5.4 Start Work

Evidence that the Contractor has started procurement of materials, preparation and submission of shop drawings, preparation of subcontracts, and other preparatory work will satisfy the requirement that work commence within ten (10) calendar days after receipt of Notice to Proceed. (See Clause titled COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK, FAR 52.212-0003.)

1.6 REPORT REQUIREMENTS

1.6.1 Accident Prevention Plan

Contractor shall provide an accident prevention plan including an activity hazard analysis to the Contracting Officer within 15 calendar days after receipt of award. Plan shall be in accordance with Contract Clause entitled "ACCIDENT PREVENTION (NOV 1991) - ALTERNATE 1.

1.6.2 Payrolls and Basic Records

Contractor shall submit payrolls and basic records in accordance with the CLAUSE entitled "PAYROLLS AND BASIC RECORDS (FEB 1988)".

1.6.3 Progress Chart

Contractor shall submit progress chart in accordance with the Contract clause entitled "SCHEDULE FOR CONSTRUCTION CONTRACTS (APR 1984)".

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Use of Materials from Non-Listed, Non-Commercially Active Sources

If after award of the contract, the Contractor proposes to use stone from a source or sources other than approved commercially active sources or the sources listed in SECTION 02486, "STONE CONSTRUCTION", Paragraph, "STONE MATERIALS", Subparagraph, "Sources" or to use soil, granular or aggregate materials for fill from a non-commercially active source or sources, the Contractor shall submit data as required in the Paragraph entitled "SUBMITTALS". The data shall be accompanied by a request for approval. Non-listed, non-commercially active stone or material sources shall not be used unless the proposal and use of the source(s) are approved by the Contracting Officer in accordance with applicable provisions of the contract. All expenses incurred by the Government and the Contractor in connection with the Contractor's request for approval for the use of materials from non-listed, non-commercially active sources shall be borne by the Contractor and all use of such materials and all operations in connection therewith shall be at the Contractor's risk. No extension of the time for completion of the work will be granted as the result of disapproval or approval of the Contractor's request to use a non-listed, non-commercially active source or sources. If not approved, the Contractor shall use materials from the applicable listed or commercially active source(s).

2.2 AS-BUILT DRAWINGS

The as-built drawing details shall be accurate and of professional quality prepared those with adequate as-built technician's qualifications.

PART 3 EXECUTION (NOT APPLICABLE)

3.1 VIDEO RECORDS

Prior to commencing any work at the project site, the Contractor shall produce video tape recordings of the conditions which exist at the project site. After the required work has been completed, a tape of the conditions at the project site shall also be produced. The physical features to be video taped shall be as indicated by the Contracting Officer's Representative at the site. Such physical features shall also include, but are not limited to, the exterior condition of all private property within 100 feet of the boundary of the required work area. The Contractor shall make every effort to obtain permission from each adjacent property owner, whose property may be affected by the construction, to enter upon the premises to make close-up video tape recordings of the exterior and interior of all structures, and upon receiving such permission shall proceed with video taping in accordance therewith. Video tape for the recording shall be of the standard full-size VHS type and shall be run at the standard or normal speed. Image recording shall be clear and provide sharp details. Every segment of tape footage shall be completely identified with either markers or title cards in the scenes, voice-over on the tape or written notes to be submitted with the tape to the Contracting

Officer. Video cassettes, G shall be marked with the project name, number, date and general description of the footage.

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SECTION 01101

REAL ESTATE

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PART 3 EXECUTION (NOT APPLICABLE)

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SECTION 01101

REAL ESTATE

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Additional Property Agreements; G-RED.

Copies of any agreements for Contractor-acquired real estate rights for this project shall be furnished before entering thereon.

1.2 REGULATORY REQUIREMENTS

1.2.1 Real Estate Rights

Rights for the use of the Government-furnished work and storage areas have been obtained and the general limits of the areas are shown on the drawings. Copies of instruments conveying rights for use of the work and storage areas shown on the drawings and specified herein are available for inspection in the Engineering & Construction Division, Design Branch, U.S. Army Corps of Engineers, Detroit District, 477 Michigan Avenue, McNamara Building, Detroit, Michigan. Conformance to all applicable requirements of the instruments conveying rights is required. Two (2) copies of each instrument will be furnished to the Contractor. All real estate lakeward of the Ordinary High Water Mark is under Federal jurisdiction and no real estate permit or agreements are necessary for work therein.

1.2.2 Additional Real Estate Rights

Any additional property agreements and/or real estate rights desired by the Contractor shall be obtained by the Contractor at its own expense. Such agreements shall clearly relieve the Government of any responsibility for damages or liability resulting from the Contractor's use of such grounds.

1.3 PROJECT/SITE CONDITIONS

1.3.1 Location and Verification

The Government will locate the limits of all lands utilized under the contract as shown on the drawings.

1.3.2 Survey Markers

All markers shall be installed in an area prior to its use and they shall be available for reference during and upon completion of use of the area. Where approved existing property markers are found, a witness stake, as

specified in Subparagraph, "Semipermanent Markers" below, shall be provided. If the types of markers specified hereinafter cannot be used, other types, as approved by the Contracting Officer, shall be provided.

1.3.2.1 Temporary Markers

Markers shall be 2" x 2", red-colored, wood hub stakes driven into the ground until stable (not less than one (1) foot penetration) with two (2) feet projecting above the ground surface. If the period in which temporary markers are to be in place exceeds one (1) construction season, a more permanent type of marker, as approved, shall be provided.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

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SECTION 01130

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SECTION 01130

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 261 Identification and listing of Hazardous Waste

ENGINEERING MANUALS (EM)

EM 385-1-1 (3 Nov. 2003) U.S. Army Corps of Engineers Safety and Health Requirements Manual

MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT)

MDOT 1996 (1996) Standard Specifications for Construction

1.2 DEFINITIONS

Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of plant or animal communities; or degrade the environment from an aesthetic, cultural or historic perspective. Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources (archaeological and historic resources); and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive materials; and other pollutants.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01130 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G-AOF.

Submit in writing an Environmental Protection Plan within ten (10) calendar days after receipt of Notice to Proceed. See Article titled ENVIRONMENTAL PROTECTION PLAN for details.

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

The Contractor shall be knowledgeable of and comply with all applicable Federal, State, and local laws, regulations, permits and licenses concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations. Note any unique requirements for this contract in the environmental pollution control plan. Also see Clauses titled "CLEAN AIR AND WATER" and "PERMITS AND RESPONSIBILITIES." The Contractor shall provide environmental protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during construction.

1.4.1 Protection of Features

This section supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. The Contractor shall prepare a list of features requiring protection under the provisions of the contract clause which are not specially identified on the drawings as environmental features requiring protection. The Contractor shall confine its activities to areas defined by the drawings and specifications. The Contractor shall protect those environmental features, indicated specially on the drawings or in the specifications, in spite of interference which their preservation may cause to the Contractor's work under the contract.

1.4.2 Permits

The Contractor shall obtain any necessary permits and licenses that have not been obtained by the Government. This section supplements the Contractor's responsibility under the contract clause PERMITS AND RESPONSIBILITIES to the extent that the Government has already obtained environmental permits.

1.4.3 Environmental Assessment of Contract Deviations

The Contract specifications have been prepared to comply with the special conditions and mitigation measures of an environmental nature which were established during the planning and development of this project. The Contractor is advised that deviations from the drawings or specifications (e.g., proposed alternate borrow areas, disposal areas, staging areas, alternate access routes, etc.) could result in the requirement for the Government to reanalyze the project from an environmental standpoint. Deviations from the construction methods and procedures indicated by the plans and specifications which may have an environmental impact will require an extended review, processing, and approval time by the Government. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.5 ENVIRONMENTAL PROTECTION PLAN

The Contractor shall submit an Environmental Protection Plan for review and acceptance by the Contracting Officer. The Government will consider an interim plan for the first 30 days of operations. However, the Contractor shall furnish an acceptable final plan not later than 30 calendar days after receipt of the Notice to Proceed. Acceptance is conditional and is

predicated upon satisfactory performance during construction. The Government reserves the right to require the Contractor to make changes in the Environmental Protection Plan or operations if the Contracting Officer determines that environmental protection requirements are not being met. The plan shall detail the actions which the Contractor shall take to comply with all applicable Federal, State, and local laws and regulations concerning environmental protection and pollution control and abatement, as well as the additional specific requirements of this contract. The Contractor shall refer to the applicable existing environmental documentation to ensure that the natural, historic, and cultural resources specific or unique to this project are protected. Any necessary coordination with and/or notices to all interested agencies and the public have been made by the Government for environmental documentation prepared by the Government. Copies of the documents are available for review at the offices of the Detroit District, Engineering & Construction Division, Environmental Analysis Branch, 7th Floor, 477 Michigan Avenue, Detroit, MI 48226. No physical work at the site shall begin prior to acceptance of the Contractor's plan or an interim plan covering the work to be performed. The environmental protection plan shall include, but not be limited to, the following:

1.5.1 Federal, State and Local Laws and Regulations

The Contractor shall be knowledgeable of all Federal, State and local environmental laws and regulations which apply to the construction operations under the Contract and shall list any unique requirements applicable to this contract as part of the Environmental Protection Plan.

1.5.2 Spill Control Plan

The Contractor shall include as part of the Environmental Protection Plan, a Spill Control Plan. The plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by the Emergency Response and Community Right-to-Know Act or regulated under State or local laws or regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

- a. The name of the individual who will be responsible for implementing and supervising the containment and cleanup.
- b. Training requirements for Contractor's personnel and methods of accomplishing the training.
- c. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
- d. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.
- e. The methods and procedures to be used for expeditious contaminant cleanup.
- f. The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Contracting Officer in

addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity spill occurs. The plan shall contain a list of the required reporting channels and telephone numbers.

1.5.3 Recycling and Waste Minimization Plan

The Contractor shall submit a Recycling and Waste Minimization Plan as a part of the Environmental Protection Plan. The plan shall detail the Contractor's actions to comply with the following recycling and waste minimization requirements:

- a. The Contractor shall participate in State and local government sponsored recycling programs to reduce the volume of solid waste materials at the source.

1.5.4 Contaminant Prevention Plan

As a part of the Environmental Protection Plan, the Contractor shall prepare a contaminant prevention statement identifying potentially hazardous substances to be used on the job site and intended actions to prevent accidental or intentional introduction of such materials into the air, water, or ground. The Contractor shall detail provisions to be taken to meet Federal, State, and local laws and regulations regarding the storage and handling of these materials.

1.5.5 Environmental Monitoring

The Contractor shall include in the plan the details of environmental monitoring requirements under the laws and regulations and a description of how this monitoring will be accomplished, including, but not limited to, monitoring of land, air, and water resources, including noise, odors and vibrations.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 SPECIAL ENVIRONMENTAL PROTECTION REQUIREMENTS

3.1.1 Work Area Limits

The Government will locate and mark wetland boundaries on the site as shown on the drawings. Prior to any construction, the Contractor shall mark the areas where the work is to be performed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible during darkness. The Contractor shall convey to its personnel the purpose of marking and/or protection of all necessary objects.

3.1.2 Protection of Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features to be preserved, indicated and defined on the drawings submitted by the Contractor as a part of the Environmental Protection Plan shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Vegetated soil surfaces disturbed by construction

activities shall be re-vegetated as soon as practicable after completing operations in the disturbed area.

3.1.2.1 Tree Protection

No ropes, cables, or guys shall be fastened to or attached to any tree(s) for anchorage unless specifically authorized by the Contracting Officer. Where such special use is permitted, the Contractor shall provide effective protection to prevent damage to the tree and other land and vegetative resources. Unless specifically authorized by the Contracting Officer, no construction equipment or materials shall be placed or used within the drip line of trees shown on the drawings to be saved. No excavation or fill shall be permitted within the drip line of trees to be saved except as shown on the drawings.

3.1.3 U.S. Department of Agriculture (USDA) Quarantined Considerations

The Contractor shall thoroughly clean all construction equipment at the prior job site in a manner that ensures all residual soil is removed and that egg deposits from plant pests are not present to prevent the spread of non-indigenous and/or pest species. The Contractor shall consult with the USDA Plant Protection and Quarantine (USDA - PPQ) jurisdictional office for additional cleaning requirements that may be necessary.

3.1.3.1 Control of Non-Indigenous Aquatic Nuisance Species

The Contractor shall conduct diligent watercraft operating practices to prevent the spread of Non-Indigent Aquatic Nuisance Species (ANS). Such practices shall include, but not be limited to, cleaning equipment on-site to prevent the spread of seeds, eggs, larvae, or other dispersal vectors (e.g. do not transport soil and plant matter from one location to another); and discharging or exchanging ballast water or other water from a vessel of any type only at a location where the chances for survival of ANS are minimal, such as at cold, deep regions of Lake Superior which are far from shore.

3.1.4 Disposal of Waste Materials

Disposal of any materials, waste, effluents, trash, garbage, oil, grease, chemicals, etc., in areas adjacent to streams, rivers, or lakes and in areas not authorized for waste disposal shall not be permitted. If any waste material is dumped or placed in unauthorized areas, the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, ground which has become contaminated through the fault or negligence of the Contractor shall be excavated, disposed of as directed by the Contracting Officer, and replaced with suitable fill material compacted and finished with topsoil and planted as required to re-establish vegetation, all at the expense of the Contractor. Disposal of waste, trash and other materials off the project site shall be in accordance with all applicable Federal, State, and local laws, rules and regulations. Removed vegetation, including trees, shall be put to beneficial reuse and not placed into landfills.

3.1.4.1 Disposal of Solid Wastes

Solid waste is rubbish, debris, waste materials, garbage, and other discarded solid materials (excluding clearing debris and hazardous waste as defined in following paragraphs). Solid waste shall be placed in containers and disposed of on a regular schedule. All handling and

disposal shall be conducted in such a way as to prevent spillage and contamination. The Contractor shall transport all solid waste off Government property and dispose in compliance with Federal, State, and local requirements. The Contractor shall comply with Federal, State, and local laws and regulations pertaining to the use of the landfill area.

3.1.4.2 Disposal of Chemical Waste

Chemical waste shall be stored in corrosion resistant containers, removed from the work area and disposed of in accordance with Federal, State, and local laws, rules and regulations.

3.1.4.3 Spillages

Special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, ashes, sawdust, waste washings, herbicides and insecticides, rubbish or sewage, and other pollutants from entering public waters.

3.1.5 Clearing Debris

Clearing debris is trees, tree stumps, tree trimmings, and shrubs, and leaves, vegetative matter, excavated natural materials (e.g., dirt, sand, and rock), and demolition products (e.g., brick, concrete, glass, and metals).

a. The Contractor shall collect trees, tree stumps, tree trimmings, shrubs, leaves, and other vegetative matter; and shall transport from Government property for proper disposal in compliance with Federal, State, and local requirements. The Contractor shall segregate the matter where appropriate for proper disposal. Untreated and unpainted scrap lumber may be disposed of with this debris where appropriate.

b. Demolition products shall be transported from Government property for proper disposal in compliance with Federal, State, and local requirements.

3.1.6 Disposal of Contractor Generated Hazardous Wastes

Hazardous wastes are hazardous substances as defined in 40 CFR 261, or as defined by applicable State and local regulations. Hazardous waste generated by construction activities shall be removed from the work area and be disposed in compliance with Federal, State, and local requirements. The Contractor shall segregate hazardous waste from other materials and wastes, and shall protect it from the weather by placing it in a safe covered location; precautionary measures against accidental spillage such as berming or other appropriate measures shall be taken. Hazardous waste shall be removed from Government property within 60 days. Hazardous waste shall not be dumped onto the ground, into storm sewers or open water courses, or into the sanitary sewer system. A copy of the manifest shall be provided to the Contracting Officer for any hazardous waste disposed of under this contract.

3.1.7 Fuels and Lubricants

Fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spills and evaporation. Lubricants and waste oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in

accordance with Federal, State, and local laws and regulations.

3.1.8 Hydrocarbons, Carbon Monoxide, and Oxides of Nitrogen and Sulfur

Vapor/gaseous emissions of hydrocarbons, carbon monoxide, oxides of nitrogen and sulfur oxides from equipment shall be controlled to Federal and State limits at all times.

3.1.9 Odors

Odors from all construction activities, processing and preparation of shall be controlled at all times.

3.1.10 Ground Vibrations

Ground vibrations from construction activities shall be controlled at all times.

3.1.11 Protection from Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize damage to the environment by noise. Construction equipment shall be fitted with noise control devices.

3.2 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

3.2.1 Discovered Historic, Archaeological, and Cultural Resources

If, during construction activities, items are observed that may have historic or archaeological value (e.g., human remains or associated objects, or artifacts are discovered), such items shall be protected in place and the observations shall be reported immediately to the Contracting Officer so that the District Archaeologist may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to, or the destruction of, these resources. The Contractor shall prevent its employees from trespassing on, removing, or otherwise disturbing such resources.

3.3 PROTECTION OF WATER RESOURCES

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters.

3.4 PROTECTION OF FISH AND WILDLIFE RESOURCES

3.4.1 Protection of Fish, Wildlife and Flora

The Contractor shall keep construction activities under surveillance, management and control to minimize interference with, disturbance to and damage of fish, wildlife and flora. Species that require specific attention along with measures for their protection shall be listed by the Contractor prior to beginning construction operations. See Subparagraph titled "Environmental Protection Plan."

3.5 PROTECTION OF AIR RESOURCES

Special management techniques as set out below shall be implemented to control air pollution by the construction activities. These techniques

supplement the requirements of Federal, State, and local laws and regulations; and the safety requirements under this Contract. If any of the following techniques conflict with the requirements of Federal, State, or local laws or regulations, or safety requirements under this contract, then those requirements shall be followed in lieu of the following.

3.5.1 Particulates

Airborne particulates, including dust particles, aerosols, and gaseous by-products from construction activities and processing and preparation of materials, shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. The Contractor shall maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, disposal sites, borrow areas, and all other work areas free from airborne dust which would cause a hazard or nuisance.

3.6 INSPECTION

If the Contracting Officer notifies the Contractor in writing of any observed noncompliance with contract requirements or Federal, State, or local laws, regulations, or permits, the Contractor shall inform the Contracting Officer of proposed corrective action and take such action to correct the noncompliance. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action is taken. No time extensions will be granted or costs or damages allowed to the Contractor for any such suspension.

3.7 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed pollution control facilities and portable pollution control devices for the duration of the Contract or for the length of time construction activities create the particular pollutant.

3.8 TRAINING OF CONTRACTOR PERSONNEL

Contractor personnel shall be trained in environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel monthly.

The training and meeting agenda shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, installation and care of facilities (vegetative covers, etc.), and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control. Anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants, shall also be discussed. Other items required to be discussed shall include recognition and protection of archaeological sites, artifacts, and historic structures.

3.9 POST CONSTRUCTION CLEANUP OR OBLITERATION

The Contractor shall obliterate all signs of temporary facilities such as haul roads, work area, structures, stock piles of excess or waste materials, fencing, buoys, stakes, or other vestiges of construction within the work, storage and access areas or as directed by the Contracting Officer. Except for surfaced areas, the areas shall be restored to near natural conditions which will permit the growth of vegetation thereon. In areas where restoration to near natural conditions is not required,

surfaces shall be evenly and smoothly dressed, sloped to drain, and the edges of the restored area graded to be flush with the surrounding existing grade even if original contours are not restored. All damaged non-surfaced areas shall be restored by topsoiling, fertilizing, seeding and mulching, unless otherwise specified or directed. The topsoiling, fertilizing, seeding, and mulching shall be in accordance with the applicable provisions of MDOT 1996, DIVISION 8, Section 816 "Turf Establishment". Dune grass planting shall be in accordance with MDOT 1996, Section 818, Dune Grass Planting.

3.10 RESTORATION OF LANDSCAPE

The Contractor shall restore all landscape features damaged or destroyed during construction operations outside the limits of the approved work areas. Such restoration shall be in accordance with the Contractor's submitted plan, as approved by the Contracting Officer. The work shall be accomplished at the Contractor's expense.

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SECTION 01312A

QUALITY CONTROL SYSTEM (QCS)

1.1 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data

1.1.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.1.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01320A, PROJECT SCHEDULE, Section 01330, SUBMITTAL PROCEDURES, and Section 01451A, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.2 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on 3-1/2 inch high-density diskettes or CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.3 SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

Hardware

IBM-compatible PC with 500 MHz Pentium or higher processor
128+ MB RAM for work station/ 256+MB RAM for server.
4 GB hard drive disk space for sole use by the QCS system
3 1/2 inch high-density floppy drive
Compact disk (CD) Reader 8X speed or higher
SVGA or higher resolution monitor (1024X768, 256 colors)
Mouse or other pointing device.
Windows compatible printer. (Laser printer must have 4 MB+ of RAM)
Connection to the Internet, minimum 256k BPS

Software

MS Windows 98, ME, NT, or 2000
Word Processing software compatible with MS Word 97 or newer
Latest version of; Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher
The Contractor's computer system shall be protected by virus protection software that is regularly upgraded with all issued manufacturer's updates throughout the life of the contract.
Electronic mail (E-mail) MAPI compatible.

1.4 RELATED INFORMATION

1.4.1 QCS User Guide

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website; the Contractor can obtain the current address from the Government. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.4.2 Contractor Quality Control(CQC) Training

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.5 CONTRACT DATABASE

Prior to the pre-construction conference, the Government shall provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by files attached to E-mail. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.6 DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government shall be submitted by E-mail with file attachments, e.g., daily reports, schedule updates, payment requests. If permitted by the Contracting Officer, a data diskette or CD-ROM may be used instead of E-mail (see Paragraph DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM). The QCS database typically shall include current data on the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format via E-mail.

1.6.1.2 Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format via E-mail.

1.6.1.3 Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main) office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.6.1.4 Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective

of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.6.2 Finances

1.6.2.1 Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.6.2.2 Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet and include it with the payment request. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment requests with supporting data by E-mail with file attachment(s). If permitted by the Contracting Officer, a data diskette may be used instead of E-mail. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01451A, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a data diskette or CD-ROM reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.6.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01451A, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government using E-mail or diskette within 24 hours after the date covered by the report. Use of either mode of submittal shall be coordinated with the Government representative. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.6.3.2 Deficiency Tracking.

The Contractor shall use QCS to track deficiencies. Deficiencies

identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.6.3.3 Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.6.3.4 Accident/Safety Tracking.

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 200.

1.6.3.5 Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.6.3.6 QC Requirements

The Contractor shall develop and maintain a complete list of QC testing, transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.6.4 Submittal Management

The Government will provide the initial submittal register, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.6.5 Schedule

The Contractor shall develop a construction schedule consisting of pay activities, in accordance with Contract Clause "Schedules for Construction Contracts", or Section 01320A, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually

or by using the Standard Data Exchange Format (SDEF) (see Section 01320A PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.6.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data, and schedule data using SDEF.

1.7 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.8 DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of updates, payment requests, correspondence and other data is by E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of computer diskettes or CD-ROM for data transfer. Data on the disks or CDs shall be exported using the QCS built-in export function. If used, diskettes and CD-ROMs will be submitted in accordance with the following:

1.8.1 File Medium

The Contractor shall submit required data on 3-1/2 inch double-sided high-density diskettes formatted to hold 1.44 MB of data, capable of running under Microsoft Windows 95 or newer. Alternatively, CD-ROMs may be used. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.8.2 Disk or CD-ROM Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.8.3 File Names

The Government will provide the file names to be used by the Contractor with the QCS software.

1.9 MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions. The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be

returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

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SECTION 01330

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SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Government-Furnished Information

Submittal register will be delivered to the contractor, by contracting officer on 3 1/2 inch disk. Register will have the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-04 Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal. A "G" indicates approval by contracting officer; a blank indicates approval by QC manager.

1.2 DEFINITIONS

1.2 Submittal

Shop drawings, product data, samples, and administrative submittals presented for review and approval. Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.3 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

- a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.
- b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.

- c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.
- d. Administrative submittals: Data presented for reviews and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

1.4 Submittal Descriptions (SD)

SD-01 Preconstruction Submittals

Certificates of insurance

Surety bonds

List of proposed subcontractors

List of proposed products

Construction Progress Schedule

Submittal schedule

Schedule of values

Health and safety plan

Work plan

Quality control plan

Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the contractor for integrating the product or system into the project.

Drawings prepared by or for the contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

SD-10 Operation and Maintenance Data

Data intended to be incorporated in operations and maintenance manuals.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

As-built drawings

Special warranties

Posted operating instructions

Training plan

1.5 SUBMITTAL CLASSIFICATION

Submittals are identified with submittal description (SD) numbers and are classified as follows:

1.5.1 Government Approved

Governmental approval is required for extensions of design, critical

materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.5.2 Designated Reviewers

The organization designated to perform the review for approval for items requiring Government approval (G) is identified by acronym in the REVIEWER column on the SUBMITTAL REGISTER, ENG FORM 4288 or ENG FORM 4288 (RMS). Following is a list of the acronyms used and their full description:

AOF = The Resident U.S. Army Corps of Engineers Area Office

RED = Real Estate Division, Detroit District, U.S. Army Corps of Engineers

AEN = The Architect/Engineer firm that designed the project

ECD = Engineering and Construction Division, Detroit District, U.S. Army Corps of Engineers

1.6 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.7 DISAPPROVED SUBMITTALS

When a submittal is returned to the Contractor and marked "DISAPPROVED" or "APPROVED AS NOTED, REVISE AND RESUBMIT", the Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.8 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION3.1 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in

the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Submittals shall be made in the required number of copies and to the applicable Area Office. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and stamped in accordance with ARTICLE titled STAMPS, and approved by the CQC representative. Each respective transmittal form (ENG FORM 4025) shall be signed and dated by the CQC representative certifying that the accompanying submittal complies with the contract requirements. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

3.2 SUBMITTAL REGISTER (ENG FORM 4288)

In Section 01999, is one set of ENG Form 4288 listing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required. The Contractor will also be given the submittal register as a diskette containing the computerized ENG Form 4288 and instructions on the use of the diskette. Columns "d" through "r" have been completed by the Government; the Contractor shall complete columns "a" and "s" through "u" and submit the forms (hard copy plus associated electronic file) to the Contracting Officer for approval within 10 calendar days after receipt of the Notice to Proceed. The Contractor shall keep this diskette up-to-date and shall submit it to the Government together with the monthly payment request. The approved submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 10 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 5 calendar days shall be allowed and shown on the register for review and approval of submittals for refrigeration and HVAC control systems.

3.4 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) enclosed in SECTION 01999 shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor, or may be copied from the enclosed form. This form shall be properly completed by filling

out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

3.5 SUBMITTAL PROCEDURE

Submittals shall be made as follows:

3.5.1 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

3.6 CONTROL OF SUBMITTALS

The Contractor shall carefully control its procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

3.7 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. The distribution of approved copies will be as specified in the Clause titled "SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION".

3.8 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals.

3.9 RESERVATION OF RIGHTS

The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

3.10 STAMPS

Stamps, approximately 2 inches high by 3 inches wide, and similar to the following, shall be used by the Contractor on the submittal data to validate approval:

CONTRACTOR
(Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s).
SIGNATURE: _____
TITLE: _____
DATE: _____

3.11 ACCIDENT PREVENTION PLAN

The format of the Contractor's Accident Prevention Plan shall be in accordance with APPENDIX A, MINIMUM BASIC OUTLINE FOR ACCIDENT PREVENTION PLAN of the SAFETY AND HEALTH REQUIREMENTS MANUAL, EM 385 1-1, 3 Sept 1996.

A copy of NCE FORM 129 is included in SECTION 01999 for use in preparing activity hazard analysis documentation.

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SECTION 01420

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SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

ACI INTERNATIONAL (ACI)
P.O. Box 9094
Farmington Hills, MI 48333-9094
Ph: 248-848-3700
Fax: 248-848-3701
E-mail: bkstore@concrete.org
Internet: <http://www.aci-int.org>

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
One East Wacker Drive, Suite 3100
Chicago, IL 60601-2001
Ph: 312-670-2400
Fax: 312-670-5403
Publications: 800-644-2400
E-mail: pubs@aisc.org
Internet: <http://www.aisc.org>

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1819 L Street, NW, 6th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: info@ansi.org
Internet: <http://www.ansi.org/>

Note --- Documents beginning with the letter "S" can be ordered from:

Acoustical Society of America (ASA)
2 Huntington Quadrangle, Suite 1N01
Melville, NY 11747-4502
Ph: 516-576-2360
Fax: 516-576-2377
E-mail: asa@aip.org
Internet: <http://asa.aip.org>

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)
1711 Arlingate Lane
P.O. Box 28518
Columbus, OH 43228-0518
Ph: 800-222-2768; 614-274-6003
Fax: 614-274-6899
E-mail: webmaster@asnt.org
Internet: <http://www.asnt.org>

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
E-mail: info@aws.org
Internet: <http://www.aws.org>

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)
P.O. Box 388
Selma, AL 36702-0388
Ph: 334-874-9800
Fax: 334-874-9008
E-mail: email@awpa.com
Internet: <http://www.awpa.com>

ASME INTERNATIONAL (ASME)
Three Park Avenue
New York, NY 10016-5990
Ph: 212-591-7722
Fax: 212-591-7674
E-mail: infocentral@asme.org
Internet: <http://www.asme.org>

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)
600 North 18th Street
P.O. Box 2641
Birmingham, AL 35291
Ph: 205-257-2530
Fax: 205-257-2540
Internet: <http://www.aeic.org>

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: <http://www.astm.org>

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

933 North Plum Grove Road
Schaumburg, IL 60173-4758
Ph: 847-517-1200
Fax: 847-517-1206
Internet: <http://www.crsi.org/>

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 Hoes Lane
Piscataway, NJ 08855-1331
Ph: 732-981-0060
Fax: 732-981-1712
E-mail: customer.services@ieee.org
Internet: <http://www.ieee.org>

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 703-841-3300
E-mail: webmaster@nema.org
Internet: <http://www.nema.org/>

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
Ph: 617-770-3000
Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: <http://www.nfpa.org>

UNDERWRITERS LABORATORIES (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096
Ph: 847-272-8800
Fax: 847-272-8129
E-mail: northbrook@us.ul.com
Internet: <http://www.ul.com/>

U.S. ARMY CORPS OF ENGINEERS (USACE)
Order CRD-C DOCUMENTS from:
U.S. Army Engineer Waterways Experiment Station
ATTN: Technical Report Distribution Section, Services
Branch, TIC
3909 Halls Ferry Rd.
Vicksburg, MS 39180-6199
Ph: 601-634-2664
Fax: 601-634-2388
E-mail: mtc-info@erdc.usace.army.mil
Internet: <http://www.wes.army.mil/SL/MTC/handbook.htm>

Order Other Documents from:
USACE Publications Depot
Attn: CEIM-SP-D
2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081
Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil

Internet: <http://www.usace.army.mil/publications>
or <http://www.hnd.usace.army.mil/techinfo/engpubs.htm>

U.S. DEPARTMENT OF AGRICULTURE (USDA)
Order AMS Publications from:
AGRICULTURAL MARKETING SERVICE (AMS)
Seed Regulatory and Testing Branch
801 Summit Crossing Place, Suite C
Gastonia, NC 28054-2193
Ph: 704-810-8870
Fax: 704-852-4189
Internet: <http://www.ams.usda.gov/lsg/seed.htm>
E-mail: seed.ams@usda.gov

Order Other Publications from:
U.S. Department of Agriculture, Rural Utilities Service
14th and Independence Avenue, SW, Room 4028-S
Washington, DC 20250
Ph: 202-720-2791
Fax: 202-720-2166
Internet: <http://www.usda.gov>

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SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Plan; G-AOF

At least ten (10) calendar days prior to commencing work submit a Quality Control Plan.

Preparatory Inspection Checklist

Within 48 hours after any preparatory phase meeting submit the original preparatory inspection checklist.

Initial Inspection Checklist

Within 48 hours after any preparatory phase meeting submit the original preparatory inspection checklist.

Daily Inspection Reports

Within 24 hours following any previous calendar day submit the original daily inspection report.

CQC System Manager; G-AOF

At least ten (10) calendar days prior to commencing work submit the qualification of the CQC manager.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with Clause titled "INSPECTION OF CONSTRUCTION." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both on-site and off-site, and shall be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality

requirements specified in the contract. The project superintendent in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.

3.2 Weekly Status Meetings

City of Wakefield wants weekly meeting with the Government and the Contractor to get status of work done, work planned, any problems encountered and address resident's comment & concerns. The Contractor shall have CQC Manager attend this meeting at the City Hall or other location within the City at the times and dates to be determined in coordination with the City of Wakefield and the Government.

3.3 QUALITY CONTROL PLAN

3.3.1 General

The Contractor shall furnish for review by the Government, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of Clause titled "INSPECTION OF CONSTRUCTION." The plan shall identify personnel, procedures, control, instructions, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.3.2 Content of the CQC Plan

The CQC plan shall include, as a minimum, the following to cover all construction operations, both on-site and off-site, including work by subcontractors, fabricators, suppliers, and purchasing agents:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC system manager who shall report to the project superintendent.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters shall also be furnished to the Government.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators suppliers, and purchasing agents. These procedures shall be in accordance with SECTION 01330, "SUBMITTAL PROCEDURES".

- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases, including documentation.
- g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may be generally considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list shall be as agreed upon during the coordination meeting.

3.3.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in its CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.3.4 Notification of Changes

After acceptance of the CQC plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.4 COORDINATION MEETING

Immediately after adjournment of the required Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the Quality Control Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC plan shall be submitted in draft form for a review a minimum of 3 working days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, administration of the system for both on-site and off-site work, and the interrelationship of the Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government and are to be signed by both the Contractor and the Contracting Officer or the Contracting Officer's Representative. The minutes shall be separate from the Preconstruction Conference minutes and shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual

understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4.1 Finalize CQC Plan

Immediately following the Preconstruction Conference, the Contractor shall finalize the CQC plan, taking into account comments made at the conference, and shall formally submit the CQC plan for acceptance. The Contractor shall allow up to 10 calendar days for review and acceptance of the finalized submittal.

3.5 QUALITY CONTROL ORGANIZATION

3.5.1 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

3.5.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the on site work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. This CQC System Manager shall be a construction person with a minimum of 3 years in related work. This CQC system manager shall be on site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned as System Manager but may have duties as project superintendent in addition to quality control. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.5.3 Additional Requirements

In addition to the above experience and education requirements the CQC System Manager shall have completed the course titled "Construction Quality Management For Contractors". This course is periodically offered at one or more of the Area Offices within the District.

3.5.4 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times that the work related to the applicable skill is ongoing. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.6 SUBMITTALS

Submittals shall be as specified in SECTION 01330, titled "SUBMITTAL PROCEDURES". The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

3.7 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors, complies with the requirements of the contract. The controls shall be adequate to cover all construction operations and will be keyed to the proposed construction sequence. The controls shall include at least three phases of control to be conducted by the CQC system manager for all definable features of work, as follows:

3.7.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

- a. A review of each paragraph of applicable specifications.
- b. A review of the contract drawings.
- c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. A review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- j. Discussion of the initial control phase.
- k. The Government shall be notified at least 24 hours in advance of beginning any of the required action of the preparatory control phase. This phase shall include a meeting conducted by the CQC system manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by a completed Preparatory Inspection Checklist and by separate minutes prepared by the CQC system manager and attached to the daily QC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.7.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

- a. A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government shall be notified at least 24 hours in advance of beginning the initial phase. A completed initial inspection checklist of this phase shall be prepared by the CQC system manager and attached to the daily QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
- g. The initial phase should be repeated for each new crew to work on-site, or any time acceptable specified quality standards are not being met.

3.7.3 Follow-up Phase

Daily checks shall be performed to assure continuing compliance with contract requirements until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.7.4 Implementation of Government Resident Management System (RMS)

The Contractor shall utilize the Government-furnished CQC Management Report. (Copy enclosed in SECTION 01999). Other Contractor desired reporting forms may be used in addition to this form. The Contractor shall use a government-furnished RMS CQC computer module for managing the quality control for this project. On the Government-furnished Input Forms in SECTION 01999 for use with the RMS, the Contractor shall provide the following information:

- (1) Prime Contractor staffing
- (2) letter codes which the Contractor wishes to use in addition to those supplied with the program libraries. A list of current existing codes is provided in SECTION 01999.
- (3) subcontractor information showing trade, name, address, and insurance expiration dates
- (4) Definable features of work from a Government provided

dictionary (may be expanded by the Contractor, as approved).

(5) Pay activity and activity information, including minimum and maximum durations for each activity on a separate listing. The sum of all activity values shall equal the contract amount and, all Bid Items and Additives shall be separately identified, in accordance with the BIDDING SCHEDULE. Bid Items may include multiple activities, but activities may only be assigned to one such Bid Item. All of the data listed in this Subpart 6 shall be provided and the RMS CQC module shall be completed to the satisfaction of the Contracting Officer prior to any contract payments (except payments for bonds, insurance and/or mobilization as approved by the Contracting Officer) and shall be updated as required.

(6) Required Quality Control tests (as applicable) tied to individual activities. The QC Reports/QC Requirements function of the RMS QC Module will be used to meet the requirements for tracking of verification and acceptance testing specified in the paragraph titled "Content of the CQC Plan".

(7) Submittal information relating to specification section, bid item number, description, activity number, review period and expected procurement period

(8) User schooling information (as applicable).

The above items shall be incorporated into the required submittal for the Contractor's Quality Control Plan required in the paragraph titled "QUALITY CONTROL PLAN" of this Section.

a. During the course of the contract, the Contractor will receive various Quality Assurance comments from the Government that will reflect corrections needed to Contractor activities or reflect outstanding or future items needing the attention of the Contractor. The Contractor shall acknowledge receipt of these comments by specific number reference on its Daily CQC Report, and will also reflect on his Daily CQC Report when these items are specifically completed or corrected to permit Government verification. The contractor will use the QC COMMENTS function of the RMS QC Module to meet the requirements for tracking construction deficiencies as specified in paragraph titled, "Content of the CQC Plan".

b. The Contractor's schedule system shall include, as specified and separate activities, all Preparatory Phase Meetings (inspections); all O&M Manuals (as applicable) and all Test Plans of Electrical and Mechanical Equipment or Systems that require validation testing or instructions to Contracting Officer Representatives (as applicable).

3.7.5 Additional Preparatory and Initial Phases

Additional preparatory and initial phases may be conducted on the same definable features of work as determined by the Government if the quality of on-going work is unacceptable; or if there are changes in the applicable QC staff or in the on-site production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

At the completion of all work the CQC system manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved plans and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph "DOCUMENTATION" below, and shall include the estimated date by which the deficiencies will be corrected. The CQC system manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final Inspection.

3.8.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at this inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptable complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain Daily Inspection Reports of quality control operations, activities, and tests performed, including the work of subcontractors. These records shall be on an acceptable form and shall include factual evidence that required quality control activities and/or tests have been performed, including but not limited to the following:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for

repair.

c. Work performed today, giving location, description, and by whom. For dredging projects, the report shall always include the character and types of materials removed. Whenever there is a significant change in the materials, the location of such change shall be included in the reports.

d. Control activities performed with results and references to specifications/plan requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.

e. Quantity of materials received at the site, with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Identify submittals reviewed, with contract reference, by whom, and action taken.

g. Off-site surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. List instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that the workmanship complies with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. All calendar days shall be accounted for throughout the life of the contract. The first report following a period of no work shall be for that day and all the no-work days since the last reported work day. Reports shall be sequentially numbered for this project, signed and dated by the CQC system manager. The report from the CQC system manager shall include copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms for the CQC Management Report, Preparatory Inspection Checklist, Initial Inspection Checklist, and other required reports and plans are enclosed in SECTION 01999. The Contractor shall tailor the checklists to include all reporting and quality control requirements specific to this project.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor at the site of the work, shall be deemed

sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor or subcontractor.

-- End of Section --

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION [01580]

CONSTRUCTION PROJECTS AND SAFETY PERFORMANCE SIGNS

PART 1 GENERAL

- 1.1 SUBMITTALS
- 1.2 QUALITY CONTROL

PART 2 PRODUCTS

- 2.1 SIGN CONSTRUCTION
 - 2.1.1 Government-Furnished Materials
 - 2.1.2 Contractor-Furnished Materials
 - 2.1.2.1 Sign Lettering

PART 3 EXECUTION

- 3.1 INSTALLATION
- 3.2 MAINTENANCE
- 3.3 REMOVAL

-- End of Section Table of Contents --

SECTION [01580]

CONSTRUCTION PROJECTS AND SAFETY PERFORMANCE SIGNS

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Sign Layouts; G-AOF.

Submit the proposed layouts before applying lettering.

1.2 QUALITY CONTROL

The Contractor shall establish and maintain a quality control system for all operations performed under this Section to assure compliance with contract requirements and maintain records of its quality control for all operations performed, including, but not limited to the following:

- a. Quality - materials and workmanship.
- b. Overall appearance of signs and site.
- c. Observance of safety regulations.

PART 2 PRODUCTS

2.1 SIGN CONSTRUCTION

The materials to be used and the manner in which they are to be assembled and installed are shown on the sketches enclosed in SECTION 01999.

2.1.1 Government-Furnished Materials

The Government will furnish and deliver to the Contractor at the project site one (1) Construction Project sign panel, four (4) feet by six (6) feet by 3/4 inch thick and one (1) Safety Performance sign panel, four (4) feet by four (4) feet by 3/4 inch thick. Each sign panel will have affixed graphics and be lettered except for the project title and the name of the Contractor. Each sign panel will embody six (6) 1/4 inch diameter T-nuts appropriately placed. The Government will retain possession of the removable numbers for the Safety Performance sign and affix them at the appropriate times.

2.1.2 Contractor-Furnished Materials

All materials necessary for construction of the signs as described on the sketches except those furnished by the Government, shall be furnished by the Contractor. All wood members shall be of well seasoned, kiln dried, clear redwood, bald cypress, red cedar, Douglas fir, spruce, tulip poplar or white pine. The lumber materials shall be free of splits, wane and loose knots or pitch pockets. Wood materials for posts, braces and stakes shall be preservative treated. All members of the sign shall be fastened with screws or bolts of type, size, number and spacing to provide rigid construction and a neat appearance. The Contractor shall furnish twelve (12) each 1/4 inch diameter by four (4) inches long Allen head bolts, threaded to match the T-nuts.

2.1.2.1 Sign Lettering

In the location provided on each sign panel, the Contractor shall apply the applicable project title, Contractor name [and architect/engineer name]. Specific information for sign layouts will be provided by the Contracting Officer's Representative (COR) at the conference specified hereinbefore in clause titled "PRE-CONSTRUCTION CONFERENCE." Lettering shall be black. The materials used for lettering shall be of a type which will adhere to the high density overlay plywood panels under all weather conditions and shall be applied in accordance with the lettering manufacturer's recommendations. Letter size, typeface and maximum line lengths are as follows:

	<u>Construction</u> <u>Project Sign</u>	<u>Safety</u> <u>Performance Sign</u>
Project Title		
Typeface	Helvetica Bold	Helvetica Regular
Letter size (inches)	3	1.5
Maximum line length (inches)	42	42
Contractor's Name		
Typeface	Helvetica Regular	Helvetica Regular
Letter size (inches)	1.25	1.5
Maximum line length (inches)	21	42
Architect/Engineer's Name		
Typeface	Helvetica Regular	
Letter size (inches)	1.25	None
Maximum line length (inches)	21	

PART 3 EXECUTION

3.1 INSTALLATION

The Contractor shall affix the panels to the posts with the Allen head bolts prior to erection of the signs, including drilling counter-sunk 1/4 inch diameter holes in the posts to match the T-nut locations. The Contractor shall take all precautions necessary to protect the faces of the signs from damage during assembly and construction. The signs shall be installed upon commencement of the work under this contract. The location in which each sign is to be installed shall be as directed by the Contracting Officer. The site on which the signs are to be installed shall be cleared and leveled to facilitate the installation of, and provide easy visual contact with, the signs. Installation and positioning of the posts,

braces and stakes shall be as indicated on the referenced sketches. Excavation and backfilling of the holes for posts and installation of the posts, braces and stakes shall be such that signs are installed plumb and level.

3.2 MAINTENANCE

The Contractor shall maintain the signs in good condition and the sign site in a neat condition throughout the construction period.

3.3 REMOVAL

Upon completion of all contract work, the signs shall be removed by the Contractor and turned over to the Contracting Officer's Representative at the site.

-- End of Section --

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01999

LISTING OF ENCLOSED DOCUMENTS, EXHIBITS AND OTHER ATTACHEMENT

PART 1 GENERAL

 1.1 ENCLOSURES

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section Table of Contents --

SECTION 01999

LISTING OF ENCLOSED DOCUMENTS, EXHIBITS AND OTHER ATTACHEMENT

PART 1 GENERAL

1.1 ENCLOSURES

This Section contains documents referenced in other Sections of the specifications. They are consolidated in this Section for the convenience of the Contractor and the Government. The Contractor may reproduce the enclosed forms for its use or obtain a supply of the forms from the Contracting Officer.

TITLE

CONSTRUCTION QUALITY MANAGEMENT REPORT - NCE FORM 63,
6 MAY 77. (2 Sides)

PREPARATORY INSPECTION CHECKLIST (3 SIDES)

INITIAL INSPECTION CHECKLIST (2 SIDES)

ACCIDENT PREVENTION PROGRAM ACTIVITY HAZARD ANALYSIS-
NCE FORM 129, 6 JUNE 1986.

RESIDENT MANAGEMENT SYSTEM FORMS (SAMPLES)

A. CURRENT ACTIVITY SUMMARY (SMPL)

B. INITIAL INSPECTION WORKSHEET

C. PREPARATORY INSPECTION WORKSHEET

D. CONTRACTOR QUALITY CONTROL REPORT (QCR)

E. TRANSMITTAL SHEET (4025-R)

RMS CORRESPONDENCE CODES

SUBMITTAL REGISTER - ENG FORM 4288, MAY 91

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA,
MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATIONS
OF COMPLIANCE ENG FORM 4025, MAY 91 (2 SIDES)

AUTHORIZATION OF ENTRY FOR CONSTRUCTION PERMIT

BENCHMARKS AND HORIZONTAL CONTROL DATA

GENERAL DECISION NO. MI030095

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

CONSTRUCTION QUALITY CONTROL MANAGEMENT

DATE _____ REPORT _____
CONTRACTOR _____ CONTRACT NO. _____
PROJECT NAME _____ LOCATION _____
WEATHER TYPE _____ TEMP. MAX _____ MIN _____ RAINFALL _____ GAGE READING _____
EMPLOYEES: SUPV. _____ SKILLED _____ LABORERS _____ LENGTH OF SHIFT _____ HR _____

WORK RESPONSIBILITY: NAME (PRIME OR SUBCONTRACTOR) AND AREA OF RESPONSIBILITY .

A. _____
B. _____
C. _____
D. _____
E. _____

WORK PERFORMED TODAY: (LOCATION, DESCRIPTION, QUANTITY AND RESPONSIBILITY BY LETTER REFERENCE
(Relate to Items on the Progress Chart or CPM)

INSPECTION: (DESCRIPTION OF INSPECTION AND LOCATION. INCLUDE OFF-SITE, MATERIALS AND EQUIPMENT INSPECTION.)

A. PREPARATORY PHASE:

B. INITIAL PHASE:

C. CONTINUOUS PHASE:

RESULTS OF INSPECTION: (INCLUDE FINDINGS, DEFICIENCIES OBSERVED & CORRECTIVE ACTION)

RESULTS OF SURVEILLANCE CONTINUED:

TEST PERFORMED: TYPE, LOCATION, RESULTS INCLUDING FAILURES & REMEDIAL ACTION,
(ATTACH COPY OF TEST REPORT OR NOTATION WHEN IT WILL BE FURNISHED.)

WORK ITEMS BEHIND SCHEDULE: REASON, EFFECT ON PROGRESS SCHEDULE AND ACTION TAKEN.

JOB SAFETY: (REPORT CONDITIONS, DEFICIENCIES, CORRECTIVE ACTION & RESULTS.)

REMARKS: LIST ATTACHMENT AND OTHER MANAGEMENT ACTIONS TAKEN TO ASSURE QUALITY
CONSTRUCTION

IF INSPECTION & RESULTS ARE NOT LISTED THEN IT IS ASSUMED THAT QUALITY CONTROL IS NOT BEING
IMPLEMENTED.
THE ABOVE REPORT IS COMPLETE AND CORRECT AND ALL MATERIALS & SUPPLIES INCORPORATED IN THE
WORK ARE IN COMPLIANCE WITH THE TERMS OF THE CONTRACT EXCEPT AS NOTED:

CONTRACTOR'S APPROVED REPRESENTATIVE SIGNATURE

ACCIDENT PREVENTION PROGRAM
ACTIVITY HAZARD ANALYSIS

Page of

1. Contract No.	2. Project	3. Facility
4. Date	5. Location	6. Estimated Start Date

7. Item	8. Phase of Work	9. Safety Hazard	10. Precautionary Action Taken

11. Contractor (Signature & Date)

12. Report discussed with contractor/ superintendent on	13. Contracting Officer (Signature & Date)
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US Army Corps
of Engineers

Current Activity Summary

08 Jul 2002

Project Name: Repair of North & South Piers, Baloney Harbor, MI
Contract Number: DACW35-02-C-####

Location Name

Activity Number	Activity Description	QUANTITY	UNIT PRICE	AMOUNT
CLIN 0001	North and South Pier Repairs	1	\$3,437,787.18 / LS	\$3,437,787.18
1001	Bonds			\$49,136.00
1002A	Prepare & Mobilize Equipment			\$94,864.00
1002B	Prepare Site			\$72,500.00
1002C	Office Trailers & Utilities			\$22,500.00
1003A	Demobilize Equipment			\$5,000.00
1003B	Site Restoration			\$2,500.00
1003C	As-Built Drawings			\$2,500.00
1004A	Furnish SSP			\$750,000.00
1004B	Furnish Special Piles			\$50,000.00
1004C	Furnish SSP Pile Shoes			\$30,000.00
1004D	Fabricate Template			\$6,000.00
1004E	Excavate Driving Line			\$100,000.00
1004F	Set & Drive SSP			\$500,000.00
1004G	Backfill Driving Line			\$50,000.00
1004I	South Driving Line Obstruction Removal			\$117,787.18
1005A	Furnish Misc. Steel			\$193,000.00
1005B	Furnish Tie-Rods			\$20,000.00
1005C	Furnish Plate Washers			\$15,000.00
1005D	Furnish Fastners			\$12,000.00
1005E	Place Misc. Steel			\$280,000.00
1006A	Demo Concrete & Remove (Rubblemound)			\$100,000.00
1006B	Excavate Existing Crib (Rubblemound Area)			\$185,000.00
1006C	Disposal of Demo Materials (Rubblemound Area)			\$25,000.00
1007A	Furnish H-Pile Materials			\$22,800.00
1007B	Install H-Piles			\$27,200.00
1008A	Furnish Rebar			\$135,000.00
1008B	Place Concrete (2000 CY @ \$250.00/CY)			\$500,000.00
1009A	Furnish Handrails			\$60,000.00
1009B	Place Handrails			\$7,000.00
1009C	Paint Handrails			\$3,000.00
				\$3,437,787.18
CLIN 0002	Fill Stone:	0	\$0.00 / NA	\$0.00
	No Activities Assigned to this Bid Item.			
CLIN 0002AA	First 18,000 tons	18,000	\$22.50 / TN	\$405,000.00
2001	Furnish & Place Fill Stone - 1st 18,000 Tons			\$405,000.00
				\$405,000.00
CLIN 0002AB	Over 10,000 tons	2,000	\$22.50 / TN	\$45,000.00
2101	Furnish & Place Fill Stone - Over 18,000 Tons			\$45,000.00
				\$45,000.00
CLIN 0003	Underlayer Stone:	0	\$0.00 / NA	\$0.00
	No Activities Assigned to this Bid Item.			
CLIN 0003AA	First 4,500 Tons	4,500	\$31.50 / TN	\$141,750.00
3001	Furnish & Place Underlayer Stone - 1st 4,500 Tons			\$141,750.00
				\$141,750.00
CLIN 0003AB	Over 4,500 tons	450	\$31.50 / TN	\$14,175.00
3101	Furnish & Place Underlayer Stone - Over 4,500 Tons			\$14,175.00
				\$14,175.00
CLIN 0004	Scour Stone:	0	\$0.00 / NA	\$0.00



US Army Corps
of Engineers

Current Activity Summary

08 Jul 2002

Project Name: Repair of North & South Piers, Baloney Harbor, MI
Contract Number: DACW35-02-C-####

Location Name

Activity Number	Activity Description	QUANTITY	UNIT PRICE	AMOUNT
CLIN 0004	Scour Stone: (Continued)	0	\$0.00 / NA	\$0.00
No Activities Assigned to this Bid Item.				
CLIN 0004AA	First 3,500 tons	3,500	\$27.50 / TN	\$96,250.00
4001	Furnish & Place Scour Stone - 1st 3,500 Tons			\$96,250.00
				\$96,250.00
CLIN 0004AB	Over 3,500 tons	600	\$27.50 / TN	\$16,500.00
4101	Furnish & Place Scour Stone - Over 3,500 Tons			\$16,500.00
				\$16,500.00
CLIN 0005	Bedding Stone:	0	\$0.00 / NA	\$0.00
No Activities Assigned to this Bid Item.				
CLIN 0005AA	First 3,000 tons	3,000	\$28.00 / TN	\$84,000.00
5001	Furnish & Place Bedding Stone - 1st 3,000 Tons			\$84,000.00
				\$84,000.00
CLIN 0005AB	Over 3,000 tons	600	\$28.00 / TN	\$16,800.00
5101	Furnish & Place Bedding Stone - Over 3,000 Tons			\$16,800.00
				\$16,800.00
CLIN 0006	Armor Stone:	0	\$0.00 / NA	\$0.00
No Activities Assigned to this Bid Item.				
CLIN 0006AA	First 6,000 tons	6,000	\$34.00 / TN	\$204,000.00
6001	Furnish & Place Armor Stone - 1st 6,000 Tons			\$204,000.00
				\$204,000.00
CLIN 0006AB	Over 6,000 tons	825	\$34.00 / TN	\$28,050.00
6101	Furnish & Place Armor Stone - Over 6,000 Tons			\$28,050.00
				\$28,050.00
Sum of CLINs				\$4,489,312.18
Sum of Activities				\$4,489,312.18
Difference				\$0.00

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK : Site Cast Concrete

A. ACTIVITIES INCLUDED UNDER Site Cast Concrete -

ABC Company, Inc

1008A	Furnish Rebar	\$135,000.00
1008B	Place Concrete (2000 CY @ \$250.00/CY)	\$500,000.00
		<hr/> \$635,000.00

B. QUALITY CONTROL REQUIREMENTS -

SUBMITTALS REQUIRED -

00700	1	SF 1413 for Subcontracts		Not submitted
03250	1	Expansion Joint Materials	A	Approved
03307	1	Batching and Mixing Equipment	F	Receipt
03307	2	Conveying and Placement Equipment	F	Receipt
03307	3	Reinforcing Steel (Mat Steel, Bar Steel)	A	Approved
03307	4	Concrete Mixture Proportions;	A	Approved
03307	5	Cementitious Material	A	Approved
03307	6	Aggregates	A	Approved
03307	7	Manufacturer's Literature	A	Approved
03307	8	Batching & Mixing Equipment - Redi-Mix	F	Receipt
03307	9	Conveying & Placing Equipment - Redi-Mix	F	Receipt
03307	10	Concrete Mix Proportions - Redi-Mix	A	Approved
03307	11	Cementitious Material - Redi-Mix	A	Approved
03307	12	Aggregates - Redi Mix	A	Approved
03307	13	Manufacturer's Data; AEA - Redi-Mix	A	Approved
03307	14	Manufacturer's Data; WRA - Redi-Mix	A	Approved
05500	2	Welders	F	Receipt
05552	4	Mill Certs - Ladder Grab Rails	A	Approved

QC TESTS -

CT # 00001	Obtain 1 Cylinder for strength testing at 7 days and 2 Cylinders for 28 days. Minimum of one set per day or 1 set per every 150 CY placed. (ASTM C-94) Required strength at 7 Days = 2,800 p.s.i.; 28 Days = 4,000 p.s.i.	Not Performed
CT # 00002	Check Batch slips for water/cement ratio not to exceed 0.40 by weight	Not Performed
CT # 00003	Check Slump at both mixer and discharge ends: Pumped = 3" - 7" at discharge Maximum of 5" at Mixer if no admixture used Maximum of 7" at mixer if admixture is used 2 checks per shift is minimum required	Not Performed
CT # 00004	2 Air Content tests required per shift. Check approved mix design for maximum and minimum values acceptable.	Not Performed

C. QA/QC PUNCH LIST ITEMS -

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK : Site Cast Concrete

C. QA/QC PUNCH LIST ITEMS - Cont.

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

E. INSPECTION CHECKS -

IN COMPLIANCE
Yes/ No/ NA

- | | | | |
|---|-------|-------|-------|
| 1. Check rebar for proper bar sizes, per approved shop drawings. | <hr/> | <hr/> | <hr/> |
| 2. Check for 3" clearance of rebar from form sides and top surface. | <hr/> | <hr/> | <hr/> |
| 3. Check for proper use of concrete vibrators | <hr/> | <hr/> | <hr/> |
| 4. Check for correct finish elevations. | <hr/> | <hr/> | <hr/> |
| 5. Concrete finish shall meet approval of on-site Government Representative. Make sure all finishers are aware of approved finishing method and degree of brooming. | <hr/> | <hr/> | <hr/> |
| 6. Ensure embedded items are not displaced during placement and finishing of the concrete. | <hr/> | <hr/> | <hr/> |
| 7. <hr/> | <hr/> | <hr/> | <hr/> |
| 8. <hr/> | <hr/> | <hr/> | <hr/> |
| 9. <hr/> | <hr/> | <hr/> | <hr/> |
| 10. <hr/> | <hr/> | <hr/> | <hr/> |

F. JOB SITE SAFETY -

IN COMPLIANCE
Yes/ No/ NA

- | | | | |
|---|-------|-------|-------|
| 1. All employees working over water are required to wear workvests (PFDs) | <hr/> | <hr/> | <hr/> |
| 2. All employees are to wear hard hats. | <hr/> | <hr/> | <hr/> |
| 3. Concrete Pump must be shut down prior to cleaning. | <hr/> | <hr/> | <hr/> |
| 4. Review Activity Hazard Analysis for Concrete Work prior to performing this work. | <hr/> | <hr/> | <hr/> |
| 5. <hr/> | <hr/> | <hr/> | <hr/> |
| 6. <hr/> | <hr/> | <hr/> | <hr/> |
| 7. <hr/> | <hr/> | <hr/> | <hr/> |
| 8. <hr/> | <hr/> | <hr/> | <hr/> |

G. QA Evaluation Notes -

DISCUSSED
Yes/ No/ NA

- | | | | |
|----------|-------|-------|-------|
| 1. <hr/> | <hr/> | <hr/> | <hr/> |
| 2. <hr/> | <hr/> | <hr/> | <hr/> |
| 3. <hr/> | <hr/> | <hr/> | <hr/> |
| 4. <hr/> | <hr/> | <hr/> | <hr/> |

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK : Site Cast Concrete

A. ACTIVITIES INCLUDED UNDER Site Cast Concrete -

ABC Company, Inc.

1008A	Furnish Rebar	\$135,000.00
1008B	Place Concrete (2000 CY @ \$250.00/CY)	\$500,000.00
		<hr/> \$635,000.00

B. QUALITY CONTROL REQUIREMENTS -**SUBMITTALS REQUIRED -**

00700	1	SF 1413 for Subcontracts		Not submitted
03250	1	Expansion Joint Materials	A	Approved
03307	1	Batching and Mixing Equipment	F	Receipt
03307	2	Conveying and Placement Equipment	F	Receipt
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03307	5	Cementitious Material	A	Approved
03307	6	Aggregates	A	Approved
03307	7	Manufacturer's Literature	A	Approved
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03307	9	Conveying & Placing Equipment - Redi-Mix	F	Receipt
03307	10	Concrete Mix Proportions - Redi-Mix	A	Approved
03307	11	Cementitious Material - Redi-Mix	A	Approved
03307	12	Aggregates - Redi Mix	A	Approved
03307	13	Manufacturer's Data; AEA - Redi-Mix	A	Approved
03307	14	Manufacturer's Data; WRA - Redi-Mix	A	Approved
05500	2	Welders	F	Receipt
05552	4	Mill Certs - Ladder Grab Rails	A	Approved

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK : Site Cast Concrete

E. REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS -

DRAWING / SPEC. NO

COMMENTS / CONFLICTS

_____	_____
_____	_____
_____	_____

DISCUSSED

Yes/ No/ NA

- | | | | |
|----|-------|-------|-------|
| 1. | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ |
| 4. | _____ | _____ | _____ |

F. REPETITIVE DEFICIENCIES FOUND ON PREVIOUS PROJECTS -

DISCUSSED

Yes/ No/ NA

- | | | | |
|----|-------|-------|-------|
| 1. | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ |
| 4. | _____ | _____ | _____ |

G. INSPECTION CHECKS -

IN COMPLIANCE

Yes/ No/ NA

- | | | | |
|----|-------|-------|-------|
| 1. | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ |
| 4. | _____ | _____ | _____ |

H. JOB SITE SAFETY -

IN COMPLIANCE

Yes/ No/ NA

- | | | | |
|----|-------|-------|-------|
| 1. | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ |
| 4. | _____ | _____ | _____ |

I. QUALITY ASSURANCE EVALUATION NOTES -

DISCUSSED

Yes/ No/ NA

- | | | | |
|----|-------|-------|-------|
| 1. | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ |
| 4. | _____ | _____ | _____ |

CONTRACTORS QUALITY CONTROL REPORT (QCR) DAILY LOG OF CONSTRUCTION - CIVIL		REPORT NUMBER 92 Page 1 of 2																					
		DATE 22 Jun 2001 - Friday																					
PROJECT North & South Pier Repair, Baloney Harbor, MI		CONTRACT NUMBER DACW35-02-C-#### NA																					
CONTRACTOR ABC Company, Inc. 555 Imagination Road, Fantasy, MI 49494		WEATHER Weather Caused No Delay Temperature Min 80 °F, Max 63 °F; 0.01 IN Precipitation; 10 MPH Wind																					
QC NARRATIVES Activities in Progress: Set and drove 24 sheets of SSP Installing Miscellaneous Steel Waler sections c/s 4+00W to 4+50W 123 Tons of Fill stone placed between existing structure and req'd SSP wall from c/s 6+25 W to 6+75W. Safety Inspection / Safety Meetings: Weekly Safety Meeting held today - Use of PPE - Hrad hats & Work Vests																							
PREP/INITIAL DATES (Preparatory and initial dates held and advance notice) A preparatory inspection was held today for the following feature: Miscellaneous Steel & Handrail An initial inspection was held today for the following feature: Miscellaneous Steel & Handrail																							
ACTIVITY START/FINISH The following activity was started today: <table border="0"> <tr> <td><u>Activity No</u></td> <td><u>Description</u></td> </tr> <tr> <td>2001</td> <td>Furnish & Place Fill Stone - 1st 18,000 Tons</td> </tr> </table> No activities were finished today				<u>Activity No</u>	<u>Description</u>	2001	Furnish & Place Fill Stone - 1st 18,000 Tons																
<u>Activity No</u>	<u>Description</u>																						
2001	Furnish & Place Fill Stone - 1st 18,000 Tons																						
QC REQUIREMENTS The following 4 QC requirements were completed today: <table border="0"> <tr> <td><u>Requirement No</u></td> <td><u>Type</u></td> <td><u>Description</u></td> <td><u>Results</u></td> </tr> <tr> <td>CT-00001</td> <td>QC Testing</td> <td>Check Plumbness of piles during driving</td> <td>Completed</td> </tr> <tr> <td>CT-00002</td> <td>QC Testing</td> <td>Check horizontal placement of piling (Check for Pile-Walk)</td> <td>Completed</td> </tr> <tr> <td>CT-00003</td> <td>QC Testing</td> <td>Check vibratory hammer driving rate for SSP - 12"/minute is the minimum rate. If exceeded, switch to Impact hammer.</td> <td>Completed</td> </tr> <tr> <td>CT-00004</td> <td>QC Testing</td> <td>Video Tape Interlocks of piling after driving SSP</td> <td>Completed</td> </tr> </table>				<u>Requirement No</u>	<u>Type</u>	<u>Description</u>	<u>Results</u>	CT-00001	QC Testing	Check Plumbness of piles during driving	Completed	CT-00002	QC Testing	Check horizontal placement of piling (Check for Pile-Walk)	Completed	CT-00003	QC Testing	Check vibratory hammer driving rate for SSP - 12"/minute is the minimum rate. If exceeded, switch to Impact hammer.	Completed	CT-00004	QC Testing	Video Tape Interlocks of piling after driving SSP	Completed
<u>Requirement No</u>	<u>Type</u>	<u>Description</u>	<u>Results</u>																				
CT-00001	QC Testing	Check Plumbness of piles during driving	Completed																				
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CT-00003	QC Testing	Check vibratory hammer driving rate for SSP - 12"/minute is the minimum rate. If exceeded, switch to Impact hammer.	Completed																				
CT-00004	QC Testing	Video Tape Interlocks of piling after driving SSP	Completed																				
QA/QC PUNCH LIST (Describe QC Punch List items issued, Report QC and QA Punch List items corrected) The following QC Punch List item was issued today: <table border="0"> <tr> <td><u>Item No</u></td> <td><u>Location</u></td> <td><u>Description</u></td> </tr> <tr> <td>QC-00001</td> <td>4+25W</td> <td>Cut-off sheets to finish grade from 4+00W to 4+50W</td> </tr> </table> No Punch List items were corrected today				<u>Item No</u>	<u>Location</u>	<u>Description</u>	QC-00001	4+25W	Cut-off sheets to finish grade from 4+00W to 4+50W														
<u>Item No</u>	<u>Location</u>	<u>Description</u>																					
QC-00001	4+25W	Cut-off sheets to finish grade from 4+00W to 4+50W																					
CONTRACTORS ON SITE (Report first and/or last day contractors were on site) No contractors had their first or last day on site today																							
LABOR HOURS The following labor hours were Reported today: <table border="0"> <tr> <td><u>Employer</u></td> <td><u>Labor Classification</u></td> <td><u>Number of Employees</u></td> <td><u>Hours Worked</u></td> </tr> <tr> <td></td> <td>IRONWORKER</td> <td>3.0</td> <td>10.0</td> </tr> <tr> <td></td> <td>PILE DRIVING SETTER</td> <td>2.0</td> <td>10.0</td> </tr> </table>				<u>Employer</u>	<u>Labor Classification</u>	<u>Number of Employees</u>	<u>Hours Worked</u>		IRONWORKER	3.0	10.0		PILE DRIVING SETTER	2.0	10.0								
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	IRONWORKER	3.0	10.0																				
	PILE DRIVING SETTER	2.0	10.0																				

CONTRACTORS QUALITY CONTROL REPORT (QCR) DAILY LOG OF CONSTRUCTION - CIVIL		REPORT NUMBER 92		Page 2 of 2
		DATE 22 Jun 2001 - Friday		
PROJECT North & South Pier Repair, Baloney Harbor, MI		CONTRACT NUMBER DACW35-02-C-####		
ABC Company, Inc. PILE DRIVER OPERATOR Total hours worked to date: 30.0		Total	1.0 6.0	10.0 30.0
EQUIPMENT HOURS The following equipment hours were Reported today:				
Equipment ID	Description		Standby Hours	Operating Hours
00000002	Vibratory Hammer		0.0	10.0
00000003	Arc Welder		0.0	8.0
00000004	Crane - 100' Boom		0.0	10.0
Total operating hours to date: 28.0		Total	0.0	28.0
ACCIDENT REPORTING (Describe accidents) No accidents reported today				
CONTRACTOR CERTIFICATION On behalf of the contractor, I certify that this Report is complete and correct and all equipment and material used and work performed during this Reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as noted above.				
QC REPRESENTATIVE'S SIGNATURE		DATE	SUPERINTENDENT'S INITIALS	DATE

RMS CORRESPONDENCE CODE

CODE	DESCRIPTION
A/E	ARCHITECT/ENGINEER
ASB	AS-BUILT INFORMATION
C	COE LETTER TO CONTRACTOR
EPA	U.S. ENVIRONMENTAL PROTECTION AGENCY
FAX	FACSIMILE TRANSMISSION
FIA	FREEDOM OF INFORMATION REQUEST
H	CONTRACTOR LETTER - FROM HOME OFFICE
LOC	LOCAL GOVERNMENT UNIT
LRE	DETROIT DISTRICT CORPS OF ENGINEERS
MDN	MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
MEM	COE IN-HOUSE MEMORANDUM
MFR	MEMORANDUM FOR RECORDS
MSC	MISCELLANEOUS CORRESPONDENCE
MTN	MINUTES OF MEETINGS
NTP	NOTICE TO PROCEED
PNM	PRICE NEGOTIATION MEMORANDUM
POC	POINTS OF CONTACT LIST
QAR	QUALITY ASSURANCE REPORT
QCR	QUALITY CONTROL REPORT
RFI	CONTRACTOR REQUEST FOR INFORMATION
RFP	COE REQUEST FOR PROPOSAL TO CONTRACTOR
S	CONTRACTOR LETTER - FROM SITE OFFICE
SEG	SNELL ENVIRONMENTAL GROUP
SUB	SUBCONTRACTOR LETTER
TEL	TELEPHONE CONVERSATION RECORDS
VM	VOICE-MAIL

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION Wakefield Electrical Substation						CONTRACTOR											
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION REVW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01100	SD-01 Preconstruction Submittals														
			Accident Prevention Plan	1.6.1													
			Payrolls and Basic Records	1.6.2													
			Progress Chart	1.6.3	G AOF												
			Non-listed, Non-Commercially Active Stone or Material Source	2.1.1	G ECD												
			Survey Note Format	1.4.7.2	G AOF												
			Video Cassettes	3.1	G												
			SD-07 Certificates														
			As-Built Technician's Qualifications	2.2													
			As-built Drawings	2.2	G AOF												
			Survey Information	1.4.7.2													
		01101	SD-01 Preconstruction Submittals														
			Additional Property Agreements	1.2.2	G RED												
		01130	SD-01 Preconstruction Submittals														
			Environmental Protection Plan		G AOF												
		01451	SD-01 Preconstruction Submittals														
			Quality Control Plan	3.3	G AOF												
			Preparatory Inspection Checklist	3.7.1													
			Initial Inspection Checklist	3.7.2													
			Daily Inspection Reports	3.9													
			CQC System Manager	3.5.2	G AOF												
			CQC System Manager	3.5.2	G AOF												
		01580	SD-02 Shop Drawings														
			Sign Layouts	2.1.2.1	G AOF												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION Wakefield Electrical Substation						CONTRACTOR											
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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02468N	SD-02 Shop Drawings														
			Survey of caisson locations	1.5.1													
			SD-06 Test Reports														
			Proof test holes reports	1.5.2	G												
			SD-11 Closeout Submittals														
			records														
		02821A	SD-07 Certificates														
			Chain Link Fence	2.1.1	G RE												
		03200A	SD-02 Shop Drawings														
			Reinforcement	3.1	G												
			SD-03 Product Data														
			Welding	1.3													
			SD-07 Certificates														
			Reinforcing Steel	2.2	G												
		03307A	SD-03 Product Data														
			Air-Entraining Admixture	2.1.3.1	G												
			Accelerating Admixture	2.1.3.2	G												
			Water-Reducing or Retarding	2.1.3.3	G												
			Admixture														
			Curing Materials	2.1.8	G												
			Reinforcing Steel	2.1.5													
			Batching and Mixing Equipment	3.1.4.3	G												
			Conveying and Placing Concrete	3.2													
			Formwork	2.1.6													
			SD-06 Test Reports														
			Aggregates	2.1.2	G												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION Wakefield Electrical Substation						CONTRACTOR											
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION OR REVIEWER	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		03307A	Concrete Mixture Proportions	1.3.3	G												
			SD-07 Certificates														
			Cementitious Materials	2.1.1	G												
			Aggregates	2.1.2	G												
		05090A	SD-03 Product Data														
			Welding Procedure Qualifications	1.5	G												
			Welder, Welding Operator, and Tacker Qualification	1.6													
			Inspector Qualification	1.7													
			Previous Qualifications	1.5.1													
			Prequalified Procedures	1.5.2													
			SD-06 Test Reports														
			Quality Control	3.2													
		05120	SD-02 Shop Drawings														
			Erection Plan	1.7.2.1	G												
			Fabrication drawings	1.7.1	G												
			SD-03 Product Data														
			Load indicator washers	2.2.4													
			Load indicator bolts	2.2.5													
			SD-06 Test Reports														
			Class B coating														
			Bolts, nuts, and washers	2.2													
			SD-07 Certificates														
			Steel	2.1													
			Bolts, nuts, and washers	2.2													
			Welding electrodes and rods	2.3.1													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION Wakefield Electrical Substation						CONTRACTOR												
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION OR A/E REVIEWER	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS	
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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	
		05120	Nonshrink grout	2.3.2														
			Galvanizing	2.4														
			AISC Quality Certification	1.5														
			Welding procedures and qualifications	1.7.2.2														
		05500A	SD-02 Shop Drawings															
			Miscellaneous Metal Items	1.6														
		16311A	SD-02 Shop Drawings															
			Detail Drawings		G DO													
			As-Built Drawings		G RO													
			SD-03 Product Data															
			Support Structures	2.4.1	G DO													
			Fault Current Analysis	2.13.4	G DO													
			Coordination Study	2.13.5	G DO													
			Battery		G DO													
			Nameplates	2.2	G DO													
			Material and Equipment		G DO													
			General Installation Requirements	3.1	G RO													
			Onsite Tests	3.6.2	G DO													
			SD-06 Test Reports															
			Factory Tests	2.14	G DO													
			Field Testing	3.5	G DO													
			Field Test Reports	3.5.1	G DO													
			SD-07 Certificates															
			Material and Equipment															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION Wakefield Electrical Substation						CONTRACTOR											
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASS SIFIC ATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		16311A	SD-10 Operation and Maintenance Data														
			Operation and Maintenance Manuals	3.6.1	G DO												
		16370A	SD-02 Shop Drawings														
			Electrical Distribution System	3.6.3	G DO												
			As-Built Drawings		G DO												
			SD-03 Product Data														
			Material and Equipment	2.2	G DO												
			General Installation Requirements	3.1	G DO												
			SD-06 Test Reports														
			Factory Tests	2.12													
			Field Testing	3.6													
			SD-07 Certificates														
			Material and Equipment	2.2													
		16375A	SD-02 Shop Drawings														
			Electrical Distribution System	3.6.3	G DO												
			SD-03 Product Data														
			Material and Equipment		G DO												
			General Installation Requirements	3.1	G DO												
			SD-06 Test Reports														
			Field Testing	3.6													
			SD-07 Certificates														
			Material and Equipment														
			Cable Joints	3.3													

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (Read instructions on the reverse side prior to initiating this form)				DATE 06/06/2002		TRANSMITTAL NO. 02486-37.2			
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS								(This section will be initiated by the contractor)	
TO: Grand Haven Area Office 307 South Harbor Street P. O. Box 629 Grand Haven, MI 49417			FROM: ABC Company, Inc 555 Imagination Park Road Fantasy, MI 49494		CONTRACT NO. DACW35-02-C-#### NA		CHECK ONE: <input type="checkbox"/> THIS IS A NEW TRANSMITTAL <input checked="" type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL 02486-37.1		
SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02486			PROJECT TITLE AND LOCATION				CHECK ONE: THIS TRANSMITTAL IS FOR <input checked="" type="checkbox"/> FIO <input type="checkbox"/> GOV'T. APPROVAL		
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.)	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See Instruction No. 6)	FOR CE USE CODE	
a.	b.	c.	d.	SPEC. PARA. NO. e.	DRAWING SHEET NO. f.	g.	h.	i.	
12	Production Test Results	DATA	3	3.2.3.4				F	
REMARKS				I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. <div style="border-top: 1px solid black; width: 100%;"></div> NAME AND SIGNATURE OF CONTRACTOR					
SECTION II - APPROVAL ACTION									
ENCLOSURES RETURNED (List by item No.)			NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY				DATE		

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.
2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.
3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288 for each entry on this form.
4. Submittals requiring expeditious handling will be submitted on a separate form.
5. Separate transmittal form will be used for submittals under separate sections of the specifications.
6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".
7. Form is self-transmittal, letter of transmittal is not required.
8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.
9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

- | | |
|---|--|
| A -- Approved as submitted | E -- Disapproved (See attached) |
| B -- Approved, except as noted on drawings. | F -- Receipt acknowledged |
| C -- Approved, except as noted on drawings.
Refer to attached sheet resubmission required. | FX -- Receipt acknowledged, does not comply
as noted with contract requirements |
| D -- Will be returned by separate correspondence. | G -- Other (Specify) |
10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

Reverse of ENG Form 4025

CITY MANAGER
(906) 229-5132

CITY OF WAKEFIELD, MICHIGAN

311 SUNDAY LAKE STREET

49968

Member
MICHIGAN MUNICIPAL LEAGUE

Fax (906) 229-5331

TDD (800) 649-3777

CITY CLERK
(906) 229-5131

April 29, 2004

Mr. Victor L. Kotwicki, Chief of Real Estate
Department of the Army
Detroit District, Corps of Engineers
Box 1027
Detroit, MI 48231-1027

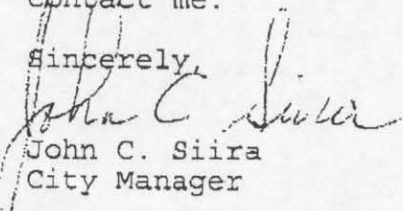
Re : Authorization for Entry - Substation Project

Dear Mr. Kotwicki,

Enclosed are three originals of the Electrical Substation Project Authorization for Entry for Construction and the City Attorney's Certification of Authority. It is the City's understanding that construction is anticipated to start this summer and be finished this fall or next spring.

Thank you for your time and assistance in this project. If you should have any questions, please do not hesitate to contact me.

Sincerely,



John C. Siira
City Manager

JCS/rz

Enc.

cc : Ray O'Dea, City Attorney

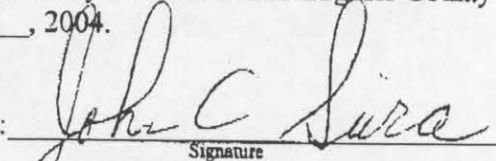
Diana Charles, Senator Carl Levin's U.P. Representative

AUTHORIZATION FOR ENTRY FOR CONSTRUCTION

I, John Siira, City Manager for the City of Wakefield in Gogebic County Michigan do hereby certify that the City of Wakefield in Gogebic County Michigan has acquired the real property interests required by the Department of the Army as set forth in Exhibit A, and otherwise is vested with sufficient title and interest in lands, to support construction of the Michigan, Western Upper Peninsula Flood Recovery and Mitigation Program, replacement of the existing electrical equipment, in the City of Wakefield in Gogebic County Michigan. Further, I hereby authorize the Department of the Army, its agents, employees and contractors, to enter upon the lands identified in Exhibit B to construct the Project as set forth in the plans and specifications held in the U.S. Army Corps of Engineers Detroit District Office, Detroit, Michigan.

WITNESS my signature as City Manager of the City of Wakefield in Gogebic County Michigan, this 28th day of April, 2004.

BY:



Signature

John C. Siira

Name

City Manager

Title

ATTORNEY'S CERTIFICATION OF AUTHORITY

I, Raymond J. O'Dea, City Attorney for the City of Wakefield in Gogebic

Name

Title of legal officer

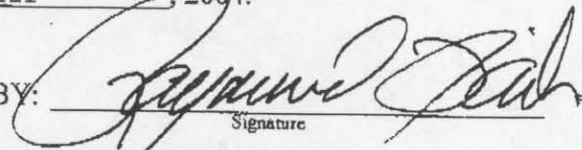
County Michigan, certify that the City of Wakefield in Gogebic County Michigan has authority to grant the above Authorization for Entry; that said Authorization for Entry is executed by the proper duly authorized officer; and that the Authorization for Entry is in sufficient form to grant the authorization therein stated.

WITNESS my signature as City Attorney for the City of Wakefield in Gogebic

Title of legal officer

County Michigan this 28th day of April, 2004.

BY:



Signature

Raymond J. O'Dea

Name

Dean, O'Dea and Pope

City Attorney

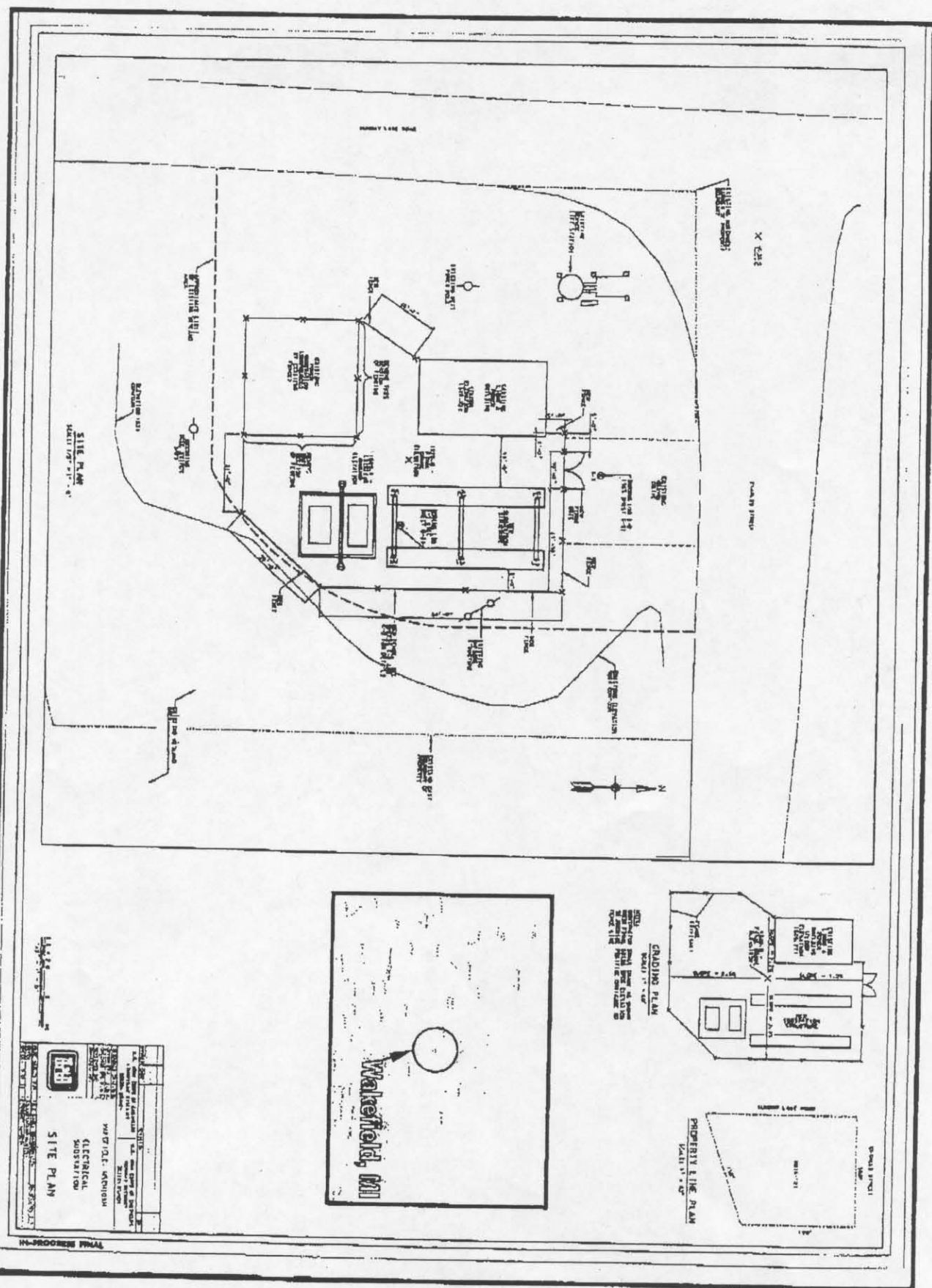
Title of legal officer

Temporary Work Area Easement:

A temporary easement and right-of-way in, on, over and across the lands described in Exhibit B for a period not to exceed two years, beginning with the date of this instrument, for use by the United States, its representatives, agents and contractors as a work area, including the right to move, store and remove equipment and supplies, erect and remove temporary structures on the land, replacement of the existing electrical equipment, and to perform any other work necessary and incident to the construction of the Michigan, Western Upper Peninsula Flood Recovery and Mitigation Program, together with the right to trim, cut, fell and remove there from all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Exhibit A

Exhibit B



General Decision Number: MI030064 05/21/2004 MI64

Superseded General Decision Number: MI020064

State: Michigan

Construction Types: Heavy

Counties: Baraga, Gogebic, Houghton, Iron, Keweenaw and
Ontonagon Counties in Michigan.

HEAVY CONSTRUCTION PROJECTS (does not include airport or bridge
construction projects, or sewer or water line work if it is
incidental to a highway construction project)

Modification Number	Publication Date
0	06/13/2003
1	03/26/2004
2	05/21/2004

BOIL0169-005 07/01/2003

	Rates	Fringes
Boilermaker (Excluding tank building).....	\$ 28.853	25% + 5.10

BRMI0006-002 05/01/2003

	Rates	Fringes
Bricklayer; marble, terrazzo and tile setter.....	\$ 21.89	10.01
Cement Mason.....	\$ 21.89	10.01
Pointer, caulker and cleaner...	\$ 20.89	10.01

FOOTNOTES: Stacks: Work on industrial and powerhouse stacks
shall receive \$2.00 per hour above the journeyman bricklayer
rate.

Industrial: Refinishing work on digesters, tanks, lime kilns,
chests, boilers, and boiler tubes shall receive \$2.00 per
hour above the journeyman bricklayer rate.

CARP1510-002 05/01/2003

	Rates	Fringes
Carpenter (Includes concrete form work).....	\$ 22.97	8.20
Millwright.....	\$ 26.59	8.42
Piledriver.....	\$ 23.17	8.20

FOOTNOTES:

Waterfront work on the Great Lakes or connecting water navigable to Lake carriers: \$0.20 per hour additional.

Work on industrial construction, defined as industrial manufacturing and processing plants such as ore plants, paper mills, power houses, foundries, saw mills, wood processing plants, or other industrial complexes: \$.30 per hour additional.

ELEC0219-002 06/02/2003

IRON COUNTY:

	Rates	Fringes
Electricians:		
Electrical contracts of		
\$90,000 or less.....	\$ 22.06	10.48
Electrical contracts		
over \$90,000.....	\$ 24.74	10.58

FOOTNOTES:

All industrial work over 30 ft. above the ground, unless on solid flooring or grating permanently attached in place: 10% per hour additional. Over 60 ft.: 20% per hour additional. Over 90 ft.: 30% per hour additional.

Work performed within 3 ft. of an unguarded opening at the above-mentioned heights to receive the above-mentioned premiums.

Work in underground mines, except mine shaft work: 10% per hour additional.

ELEC0219-012 06/02/2003

BARAGA, GOGEBIC, HOUGHTON, KEWEENAW AND ONTONAGON COUNTIES:

	Rates	Fringes
Electricians:		
Electrical contracts of		
\$70,000 or less.....	\$ 19.38	10.38
Electrical contracts		
over \$70,000.....	\$ 24.74	10.58

FOOTNOTES: All industrial work over 30 ft. above the ground, unless on solid flooring or grating permanently attached in place: 10% per hour additional. Over 60 ft.: 20% per hour additional. Over 90 ft.: 30% per hour additional.

Work performed within 3 ft. of an unguarded opening at the above-mentioned heights to receive the above-mentioned premiums.

Work in underground mines, except mine shaft work: 10% per hour additional.

* ELEC0876-004 06/01/2003

	Rates	Fringes
Line Construction: cable splicer.....	\$ 28.13	2.45+22%
Line Construction: light equipment operator/ground person/truck driver/ground pe winch, A-frame, diggers when used for distribution line truck and used for distribution work. Distribution truck driver, 5th wheel type trucks, bucket trucks, ladder trucks and all live boom trucks, all equipment 85 hp or under....	\$ 17.79	2.45+22%
Line Construction: line technician.....	\$ 27.00	2.45+22%
Line Construction: operator/ground person digger, tractor and setting rig with tracks or rough terrain vehicle, large bombardier, backhoe over 85 hp, hydraulic crane 10 ton or over.....	\$ 20.31	2.45+22%
Line Construction: truck driver/ground person trucks with winch or boom or dump, other than distribution work.....	\$ 16.93	2.45+22%

FOOTNOTE:

Operators of 5/8 yd. rated capacity backhoe or over, and
operators of 25 ton, rated capacity, crane or over, and
operators of heavy duty tension or pulling machinery on 345
KV and above, shall receive the line technician rate of pay.

* ENGI0324-012 05/01/2003

	Rates	Fringes
Power Equipment Operator (STEEL ERECTION:) Compressor; forklift; welder.....	\$ 21.49	5.75
Crane operator, main boom & jib 120' or longer.....	\$ 25.24	5.75
Crane operator, main boom & jib 140' or		

longer.....	\$ 25.49	5.75
Crane operator, main boom & jib 220' or longer.....	\$ 25.74	5.75
Mechanic with truck and tools.....	\$ 26.24	5.75
Oiler and fire tender.....	\$ 20.19	5.75
Regular operator.....	\$ 24.74	5.75

 * ENGI0326-001 05/01/2004

	Rates	Fringes
Power equipment operators - gas distribution and duct installation work:		
GROUP 1.....	\$ 20.43	15.16
GROUP 2-A.....	\$ 20.34	15.15
GROUP 2-B.....	\$ 20.15	15.12
GROUP 3.....	\$ 19.47	15.02
GROUP 4.....	\$ 19.03	14.96

SCOPE OF WORK:

The construction, installation, treating and reconditioning of pipelines transporting gas vapors within cities, towns, subdivisions, suburban areas, or within private property boundaries, up to and including private meter settings of private industrial, governmental or other premises, more commonly referred to as "distribution work," starting from the first metering station, connection, similar or related facility, of the main or cross country pipeline and including duct installation.

POWER EQUIPMENT - GAS DISTRIBUTION CLASSIFICATIONS

GROUP 1: Mechanic, crane (over 1/2 yd. capacity), backhoe (over 1/2 yd. capacity), grader (Caterpillar 12 equivalent or larger)

GROUP 2-A: Trencher, backhoe (1/2 yd. capacity or less)

GROUP 2-B: Crane (1/2 yd. capacity or less), compressor (2 or more), dozer (D-4 equivalent or larger), endloader (1 yd. capacity or larger), pump (1 or 2 six-inch or larger), side boom (D-4 equivalent or larger)

GROUP 3: Backfiller, boom truck (powered), concrete saw (20 hp or larger), dozer (less than D-4 equivalent), endloader (under 1 yd. capacity), farm tractor (with attachments), pump (2-4 under six-inch capacity), side boom tractor (less than D-4 equivalent), tamper (self-propelled)

GROUP 4: Oiler, grease person

 ENGI0326-014 05/01/2002

	Rates	Fringes
Power equipment operators		

(includes underground
construction):

Crane operator, main boom & jib 120'		
or longer.....	\$ 24.19	11.40
Crane operator, main boom & jib 140'		
or longer.....	\$ 24.44	11.40
Crane operator, main boom & jib 220'		
or longer.....	\$ 24.69	11.40
GROUP 1.....	\$ 23.69	11.40
GROUP 2.....	\$ 20.44	11.40
GROUP 3.....	\$ 19.86	11.40
GROUP 4.....	\$ 18.92	11.40
Mechanic with truck and tools.....	\$ 25.19	11.40

FOOTNOTES:

Swing boom truck operator over 15 tons: \$.50 per hour
additional.

Hydraulic crane operator 75 tons and under: \$.75 per hour
additional.

Hydraulic crane operator over 75 tons: \$1.00 per hour
additional.

Lattice boom crane operator: \$1.50 per hour additional.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Regular equipment operator, crane, dozer, front end
loader, job mechanic, pumpcrete and squeezeconcrete, welder

GROUP 2: Air track drill, boom truck (non-swing), concrete
mixer, material hoist and tugger, pump 6" and over,
beltcrete, sweeping machine, trencher, winches, well points
and freeze systems

GROUP 3: Air compressor, conveyor, concrete saw, farm tractor
(without attachments), fork truck, generator, guard post
driver, mulching machine, pumps under 6-in., welding machine
and grease person

GROUP 4: Oiler, fire tender and heater operator

* ENGI0326-016 10/01/2003

	Rates	Fringes
Power equipment operators - sewer relining:		
GROUP 1.....	\$ 24.87	8.90
GROUP 2.....	\$ 23.48	8.90

SEWER RELINING CLASSIFICATIONS

GROUP 1: Operation of audio-visual closed circuit TV system,
including remote in-ground cutter and other equipment used in

connection with the CCTV system

GROUP 2: Operation of hot water heaters and circulation systems, water jetters and vacuum and mechanical debris removal systems

* ENGI0326-017 10/01/2003

	Rates	Fringes
Power equipment operators - hazardous waste removal:		
LEVEL A:		
Engineer when operating crane with boom and jib or leads 140' or longer.....	\$ 30.87	12.25
Engineer when operating crane with boom and jib or leads 220' or longer.....	\$ 31.17	12.25
GROUP 1.....	\$ 28.22	12.25
GROUP 2.....	\$ 24.07	12.25
Regular crane operator, mechanic, dragline operator, boom truck operator and concrete pump with boom operator.....	\$ 29.19	12.25
LEVEL B AND C:		
Engineer when operating crane with boom and jib or leads 140' or longer.....	\$ 29.92	12.25
Engineer when operating crane with boom and jib or leads 220' or longer.....	\$ 29.81	12.25
GROUP 1.....	\$ 27.27	12.25
GROUP 2.....	\$ 23.13	12.25
Regular crane operator, mechanic, dragline operator, boom truck operator and concrete pump with boom operator.....	\$ 28.24	12.25
LEVEL D WHEN CAPPING		
LANDFILL:		
Engineer when operating crane with boom and jib or leads 140' or longer.....	\$ 28.37	12.25
Engineer when operating crane with boom and jib or leads 220' or longer.....	\$ 28.67	12.25
GROUP 1.....	\$ 25.72	12.25
GROUP 2.....	\$ 21.58	12.25
Regular crane operator, mechanic,		

dragline operator, boom truck operator and concrete pump with boom operator.....	\$ 26.69	12.25
LEVEL D:		
Engineer when operating crane with boom and jib or leads 140' or longer.....	\$ 28.62	12.25
Engineer when operating crane with boom and jib or leads 220' or longer.....	\$ 28.92	12.25
GROUP 1.....	\$ 25.97	12.25
GROUP 2.....	\$ 21.83	12.25
Regular crane operator, mechanic, dragline operator, boom truck operator and concrete pump with boom operator.....	\$ 26.94	12.25

HAZARDOUS WASTE REMOVAL CLASSIFICATIONS

GROUP 1: Backhoe, batch plant operator, clamshell, concrete breaker when attached to hoe, concrete cleaning decontamination machine operator, concrete pump, concrete paver, crusher, dozer, elevating grader, endloader, farm tractor (90 h.p. and higher), gradall, grader, heavy equipment robotics operator, loader, pug mill, pumpcrete machines, pump trucks, roller, scraper (self-propelled or tractor drawn), side boom tractor, slip form paver, slop paver, trencher, ultra high pressure waterjet cutting tool system operator, vactors, vacuum blasting machine operator, vertical lifting hoist, vibrating compaction equipment (self-propelled), and well drilling rig

GROUP 2: Air compressor, concrete breaker when not attached to hoe, elevator, end dumps, equipment decontamination operator, farm tractor (less than 90 h.p), forklift, generator, heater, mulcher, pigs (portable reagent storage tanks), power screens, pumps (water), stationary compressed air plant, sweeper, and welding machine

IRON0008-006 05/01/2003

	Rates	Fringes
Ironworker, reinforcing and structural		
General contracts		
\$10,000,000 or greater.....	\$ 25.07	12.51
General contracts less than \$10,000,000.....	\$ 22.50	12.51

IRON0008-009 05/01/2003

	Rates	Fringes
--	-------	---------

Ironworker - pre-engineered metal building erector		
Contracts \$10,000,000 or greater.....	\$ 25.07	12.51
Contracts less than \$10,000,000.....	\$ 22.50	12.51

LABO0005-021 10/01/2001

	Rates	Fringes
Laborers - hazardous waste abatement:		
Work performed inside the building and up to and including 5 ft. outside the building:		
Level A, B or C.....	\$ 19.75	6.06
Work performed in conjunction with site preparation not requiring the use of personal protective equipment; Also,		
Level D.....	\$ 18.75	6.06
Work performed over 5 ft. outside the building:		
Level A, B or C.....	\$ 18.93	5.26
Work performed in onjunction with site preparation not requiring the use of personal protective equipment; Also,		
Level D.....	\$ 17.93	5.26

* LABO0259-004 09/01/2003

	Rates	Fringes
Laborers - tunnel, shaft and caisson:		
GROUP 1.....	\$ 20.62	6.35
GROUP 2.....	\$ 20.73	6.35
GROUP 3.....	\$ 20.85	6.35
GROUP 4.....	\$ 20.92	6.35
GROUP 5.....	\$ 21.07	6.35
GROUP 6.....	\$ 18.37	6.35
GROUP 7.....	\$ 15.01	6.35

TUNNEL LABORER CLASSIFICATIONS

GROUP 1: Tunnel, shaft and caisson laborer, dump, shanty, hog
house tender, testing (on gas)

GROUP 2: Manhole, headwall, catch basin builder, bricklayer
tender, mortar, material mixer, fence erector and guard rail

builder

GROUP 3: Air tool operator (jackhammer, bush hammer and grinder), first bottom, second bottom, cage tender, car pusher, carrier, concrete, concrete form, concrete repair, cement invert laborer, cement finisher, concrete shoveler, conveyor, floor, gasoline and electric tool operator, gunite, grout operator, welder, heading dinky person, inside lock tender, pea gravel operator, pump, outside lock tender, scaffold, top signal person, switch person, track, tugger, utility person, vibrator, winch operator, pipe jacking, wagon drill and air track operator and concrete saw operator (under 40 h.p.)

GROUP 4: Tunnel, shaft and caisson mucker, bracer, liner plate, long haul dinky driver and well point

GROUP 5: Tunnel, shaft and caisson miner, drill runner, key board operator, power knife operator, reinforced steel or mesh (e.g. wire mesh, steel mats, dowel bars, etc.)

GROUP 6: Dynamite and powder

GROUP 7: Restoration laborer, seeding, sodding, planting, cutting, mulching and top soil grading; and the restoration of property such as replacing mailboxes, wood chips, planter boxes, flagstones, etc.

SCOPE OF WORK: Tunnel, shaft and caisson work of every type and descripton and all operations incidental thereto, including, but not limited to, shafts and tunnels for sewers, water, subways, transportation, diversion, sewerage, caverns, shelters, aquafers, reservoirs, missile silos and steel sheeting for underground construction.

* LAB00260-008 08/01/2003

	Rates	Fringes
Asbestos Laborer		
Includes removing and disposing of all insulation materials from walls, ceilings, floors, columns, and all other non-mechanical surfaces; and removal of insulating materials from mechanical systems that are to be demolished;		
loading/unloading of bagged and tagged materials at the disposal site (includes lead paint abatement clean-up).....	\$ 19.53	5.65

	Rates	Fringes
Laborers - open cut:		
GROUP 1.....	\$ 18.45	6.35
GROUP 2.....	\$ 18.59	6.35
GROUP 3.....	\$ 18.72	6.35
GROUP 4.....	\$ 18.77	6.35
GROUP 5.....	\$ 18.82	6.35
GROUP 6.....	\$ 16.20	6.35
GROUP 7.....	\$ 14.31	6.35

LABORER CLASSIFICATIONS

GROUP 1: Construction laborer

GROUP 2: Mortar and material mixer, concrete form person, signal person, well point person, manhole, headwall and catch basin builder, guard rail builder, headwall, seawall, breakwall, dock builder and fence erector

GROUP 3: Air, gasoline and electric tool operator, vibrator operator, driller, pump person, tar kettle operator, bracer, rodder, reinforced steel or mesh person (e.g., wire mesh, steel mats, dowel bars, etc.), welder, pipe jacking and boring person, wagon drill and air track operator and concrete saw operator (under 40 h.p.), windlass and tugger person and directional boring person

GROUP 4: Trench or excavating grade person

GROUP 5: Pipe layer (including crock, metal pipe, multi-plate or other conduits)

GROUP 6: Grouting person, audio-visual television operations and all other operations in connection with closed circuit television inspection, pipe cleaning and pipe relining work

GROUP 7: Restoration laborer, seeding, sodding, planting, cutting, mulching and top soil grading; and the restoration of property such as replacing mailboxes, wood chips, planter boxes, flagstones, etc.

SCOPE OF WORK:

Open cut construction work shall be construed to mean work which requires the excavation of earth including industrial, commercial and residential building site excavation and preparation, land balancing, demolition and removal of concrete and underground appurtenances, grading, paving, sewers, utilities and improvements; retention, oxidation, flocculation and irrigation facilities, and also including but not limited to underground piping, conduits, steel sheeting for underground construction, and all work incidental thereto, and general excavation.

Open cut construction work shall not include any structural modifications, alterations, additions and repairs to buildings, or highway work, including roads, streets, bridge construction and parking lots or steel erection work and

excavation for the building itself and back filling inside of and within 5 ft. of the building and foundations, footings and piers for the building. Open cut construction work shall not include any work covered under Tunnel, Shaft and Caisson work.

LAB01329-002 05/01/2003

	Rates	Fringes
Laborers:		
General contracts \$15 million and over:		
GROUP 1.....	\$ 19.80	6.85
GROUP 2.....	\$ 19.90	6.85
GROUP 3.....	\$ 20.20	6.85
GROUP 4.....	\$ 20.35	6.85
GROUP 5.....	\$ 20.55	6.85
GROUP 6.....	\$ 21.85	6.85
General contracts less than \$15 million:		
GROUP 1.....	\$ 18.43	6.85
GROUP 2.....	\$ 18.53	6.85
GROUP 3.....	\$ 18.83	6.85
GROUP 4.....	\$ 18.98	6.85
GROUP 5.....	\$ 19.18	6.85
GROUP 6.....	\$ 20.48	6.85

FOOTNOTE: Work on waterfront work (working over water) on the Great Lakes or connecting waters navigable to lake carriers: \$0.75 per hour additional.

LABORER CLASSIFICATIONS

GROUP 1: All construction laborers on building and heavy construction work, storm and sanitary sewers, tool crib attendant, rod person, oxi-gun operator, worker using propane or acetylene cutting torch, motor-driven buggies, chipping hammers, tamping machines, green cutting (whether run by air, electric or gas), and sandblasters

GROUP 2: Mortar mixer, material mixer (whether done by hand or machine), vibrator operator, concrete mixer, laborer with concrete crew, mixer to pour, including pour from trucks

GROUP 3: Cement gun nozzle operator, blaster, miner, driller, buster operator, layer of all non-metallic pipe

GROUP 4: Caisson worker

GROUP 5: Air track

GROUP 6: Digester, tanks & kilns

PLUM0190-006 05/01/2003

	Rates	Fringes
Gas Distribution Pipeline		
All other work.....	\$ 17.11	7.12

Welding in conjunction with gas distribution pipeline work.....	\$ 26.25	10.16
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PLUM0506-009 06/01/2003

BARAGA, HOUGHTON, KEWEENAW AND ONTONAGON COUNTIES:

	Rates	Fringes
Pipefitter		
All other work.....	\$ 25.71	12.05
Hvac contracts \$50,000 or less.....	\$ 20.57	12.05

FOOTNOTES: Welders working on Chrome Moly or PP Stamp work:
\$.50 per hour additional.

Workers working in a confined space as defined in Title 29
Code of Federal Regulations 1910.146, and required to wear a
selfcontained breathing apparatus: \$1.00 per hour additional.

Workers working with or around hazardous materials as
specified in Title 29 Code of Federal Regulations 1926.65,
and required to wear protective rubber gloves, boots and a
selfcontained breathing apparatus or a complete hazardous
materials protective bodysuit (Level B or more protective):
\$1.00 per hour additional.

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GOGEBIC AND IRON COUNTIES:

	Rates	Fringes
Pipefitter		
All other work.....	\$ 25.71	12.05
Hvac contracts \$50,000 or less.....	\$ 20.57	12.05

FOOTNOTES: Welders working on Chrome Moly or PP Stamp work:
\$.50 per hour additional.

Workers working in a confined space as defined in Title 29
Code of Federal Regulations 1910.146, and required to wear a
selfcontained breathing apparatus: \$1.00 per hour additional.

Workers working with or around hazardous materials as
specified in Title 29 Code of Federal Regulations 1962.65,
and required to wear protective rubber gloves, boots and a
selfcontained breathing apparatus or a complete hazardous
materials protective bodysuit (Level B or more protective):
\$1.00 per hour additional.

SHEE0007-019 01/01/2000

	Rates	Fringes
Sheet metal worker.....	\$ 22.30	9.87

SUMI2000-006 05/05/2000

	Rates	Fringes
BUILDING CONSTRUCTION (TANK BUILDER).....	\$ 19.50	1.04
Laborer: Chain Saw.....	\$ 14.29	
Landscape Laborer.....	\$ 13.20	4.01
Truck drivers:		
Boom truck.....	\$ 17.40	5.52
Truck driver - 2-axle.....	\$ 16.41	4.30
Truck driver - 3-axle.....	\$ 16.83	7.44
Well Driller (water well).....	\$ 27.59	.13

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	Rates	Fringes
Truck drivers (does not include boom truck, or two- or three-axle trucks):		
GROUP 1.....	\$ 19.62	3.76/hr.+ 17
GROUP 2.....	\$ 19.77	3.76/hr.+ 17
GROUP 3.....	\$ 19.83	3.76/hr.+ 17
GROUP 4.....	\$ 19.98	3.76/hr.+ 17

PAID HOLIDAYS: Memorial Day, Fourth of July, Labor Day and
Thanksgiving Day, if the regular work day immediately
preceding or following the holiday is either worked or an
excused absence.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: All other trucks

GROUP 2: Heavy duty and semi trucks

GROUP 3: Truck repair and maintenance

GROUP 4: Euclid type equipment

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.
=====

Unlisted classifications needed for work not included within
the scope of the classifications listed may be added after
award only as provided in the labor standards contract clauses
(29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an

interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION

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SECTION 02468N

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SECTION 02468N

DRILLED FOUNDATION CAISSONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1996) Carbon Structural Steel
ASTM A 123	(1989; Rev. A) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 615/A 615M	(1996; Rev. A) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(1996) Structural Welding Code - Steel
AWS D1.4	(1992) Structural Welding Code - Reinforcing Steel

1.2 Measurement and Payment

No separate payment will be made for the work covered under this section and all costs in connection herewith shall be included in the applicable contract price for the item to which the work pertains.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Survey of caisson locations; G

SD-06 Test Reports

Proof test holes reports; G

SD-11 Closeout Submittals

Caisson records

Submit detailed records for each caisson as specified in paragraph entitled "Records."

1.4 DELIVERY AND STORAGE

Deliver casings and appurtenant equipment to the job site in an undamaged and ready to place condition. Delivery of concrete shall be in accordance with requirements of Section 03307A, "CONCRETE FOR MINOR STRUCTURES"

1.5 QUALITY ASSURANCE

1.5.1 Survey of Caisson Locations

Submit a certified survey meeting the requirements specified herein.

1.5.2 Proof Test Holes Reports

Submit four copies of proof test holes reports before concrete filling of caissons.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Concrete Work

Section 03307A, "CONCRETE FOR MINOR STRUCTURES," as modified herein:

2.1.1.1 Strength

Concrete strength shall be 4000 psi at 28 days. Slump shall be from 4 to 6 inches.

2.1.1.2 Coarse Aggregate

Maximum size of coarse aggregate shall be 1 inch.

2.1.1.3 Reinforcing Steel

ASTM A 615/A 615M Grade 60. Steel shall be welded into cages in accordance with AWS D1.4.

2.1.2 Welding

Shop and field welding shall be in accordance with AWS D1.1/D1.1M. Qualification of welding procedures, welders, and welding operators shall be in accordance with AWS D1.1/D1.1M. Records of test results of welding procedures not prequalified and copies of records for each qualified welding operator, containing records on positions of welding and types of electrode qualifications, shall be kept by the Contractor and be available for examination by the Contracting Officer.

2.1.3 Casing Steel

ASTM A 36/A 36M. Zinc coating of casing steel shall conform to ASTM A 123. Casings shall have outside diameters not less than indicated shaft sizes and shall be a minimum of 1/4 inch thick.

2.2 CAISSON DRILLING EQUIPMENT

Caisson drilling equipment shall have minimum torque capacity and downward force capacity suitable for the site conditions.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Excavation

Drill caissons to depths and dimensions shown on the drawings. If bedrock is encountered, the caisson shall be drilled five (5) feet into rock. Drilling of caisson shall not be within 20 feet of concrete placed within last 3 days. Clean bottoms of caissons of loose, soft, or disturbed materials and level. Dispose of excavated material off site. Excavations made below indicated depths, without specific direction by the Contracting Officer, shall be filled with concrete. Where, in the opinion of the Contracting Officer, materials are encountered at the indicated depths that do not provide the required bearing capacity or would result in unsatisfactory construction, the excavation shall be extended as directed by the Contracting Officer and an adjustment in the contract requirements will be made. Notwithstanding the above, the maximum length of caisson shaft shall not exceed forty (40) feet.

3.1.2 Protection and Casings

In drilling caissons, protect surrounding soil and excavated walls against cave-ins, displacement of the surrounding earth, and retention of ground water by means of temporary steel casings, sheeting, or use of bentonite slurry. Casings shall not be driven within 20 feet of concrete placed within last 3 days. If Contracting Officer determines that the structural integrity of the caisson will be impaired, the casing shall be left in place and an adjustment in the contract requirements will be made. Withdraw temporary steel casings, as concrete is placed, maintaining sufficient head of concrete within the casing to prevent extraneous material from falling in from the sides and mixing with the concrete. Casings may be jerked upward a maximum of 4 inches to break the bottom seal but thereafter removed with a smooth, continuous motion. All voids surrounding the casing shall be filled with concrete extruded from the bottom of the casing as it is being raised, with all free water surrounding the casing being forced to the surface ahead of the rising concrete. Provide venting if necessary to ensure removal of water around the casing as the concrete level rises and the casing is being removed.

3.1.2.1 Cleaning Casings

Clean inside of steel casings thoroughly and oil before reuse.

3.1.2.2 Temporary Casings

The temporary casing shall be in place from the caisson top to the ground surface until the concrete has set if the elevation of the top of the caisson is below the adjacent ground surface.

3.1.2.3 Casings with Soft Subbase

Continuously remove water that flows into the excavations and the excavation bottom prior to concrete placement. The maximum permissible water depth will be 2 inches at the start of concrete placement. If severe water conditions make it impossible or impractical to dewater the excavation, deepen the excavation to undisturbed material and place concrete using underwater tremie after water movement has stabilized.

3.1.3 Filling

Prior to placing concrete, inspect caisson excavation to ensure that deleterious material or detrimental conditions are not present in the excavation. Concrete shall be placed within 3 hours after completing excavation. Place concrete continuously by methods that ensure against segregation and dislodging of excavation sidewalls and completely fill the bell and shaft. Place concrete by pumping, tremie, or drop chutes. For concrete placed by pumping or tremie, the discharge shall be kept a minimum of 3 feet below the fresh concrete surface during placement.

3.1.3.1 Keys for Placement in Lifts

Bring concrete to a true level surface inside the shaft and form a full width cross key or install dowels should it become necessary to interrupt placing concrete in any caisson. Prior to placing additional concrete, clean surfaces of laitance and slush with one to one portland cement grout. The grout shall have a water cement ratio not exceeding that of the concrete.

3.1.3.2 Chute Placement

Place concrete in dry batter caissons with a drop chute extending within 3 feet of the concrete surface in the excavation.

3.1.3.3 Concrete Vibration

Vibrate concrete for full height of caisson for caissons without permanent encasing. For caisson, with permanent encasing, vibrate only the bell of the caisson.

3.1.4 Reinforcement

Install as indicated. Insert securely in the caissons, in position and alignment, as shown, prior to concrete placement.

3.2 TOLERANCES

3.2.1 Alignment

Caissons out of center or plumb beyond the tolerance specified shall be corrected to comply with the tolerances and the Contractor shall bear any cost of correction. Method of correction shall be approved by the Contracting Officer.

3.2.2 Cross Sections of Shafts

Shall not be less than design dimensions.

3.2.3 Top Location of Caissons

Install with top location deviating not more than 3 inches from centerline locations.

3.2.4 Vertical Caissons

Install plumb within a maximum of 1 1/2 inches for the first 10 feet and 1/2 inch for each 10 feet of additional depth.

3.2.5 The Center of the Caisson

Shall be established after construction is completed and the center marked by a suitable permanent mark.

3.3 TESTS

3.3.1 Proof Test Holes

3.3.1.1 Soundness of Rock Test

If rock is encountered in drilling caissons, test for soundness is required. After excavation, proof test the soundness of the rock below the caisson bearing level by rotary core, drilling one hole in each caisson in locations indicated. The core shall be retained and inspected to verify rock conditions.

3.3.1.2 Drilling

Holes shall be 2 inches drilled with a uniform downward pressure to a depth below the bearing level equal to the design caisson shaft diameter but to a minimum of 4 feet.

3.3.1.3 Drilling Records

Record penetration time for successive 6 inch increments, noting conditions encountered.

3.3.1.4 Test Approval

The Contracting Officer will approve test holes and authorize subsequent concrete placement or initiate redesign procedures.

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SECTION 02821A

FENCING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 121	(1999) Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM A 153/A 153M	(1995) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 392	(1996) Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 491	(1996) Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 585	(1997) Aluminum-Coated Steel Barbed Wire
ASTM A 780	(1993; Rev. A) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 824	(1995) Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM F 1043	(1995) Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework
ASTM F 1083	(1997) Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(1994) Industrial and Commercial Horizontal Slide Gates
ASTM F 626	(1996a) Fence Fittings
ASTM F 900	(1994) Industrial and Commercial Swing Gates

1.2 MEASUREMENT AND PAYMENT

This work will not be measured or paid for separately, but shall be considered incidental to the contract.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Chain Link Fence; G, RE

Statement, signed by an official authorized to certify on behalf of the manufacturer, attesting that the chain link fence and component materials meet the specified requirements.

PART 2 PRODUCTS

2.1 FENCE FABRIC

Fence fabric shall conform to the following:

2.1.1 Chain Link Fence Fabric

ASTM A 392, Class 1, zinc-coated steel wire with minimum coating weight of 1.2 ounces of zinc per square foot of coated surface, or ASTM A 491, Type I, aluminum-coated steel wire. Fabric shall be fabricated of 9 gauge wire woven in 2 inch mesh. Fabric height shall be 6 feet as shown. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

2.2 GATES

ASTM F 900 and/or ASTM F 1184. Gate shall be the type and swing shown. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Gate frames shall conform to strength and coating requirements of ASTM F 1043, for Group IC, steel pipe with external coating Type A or Type B, nominal pipe size (NPS) 1-1/2. Gate fabric shall be as specified for chain link fabric. Gate leaves more than 8 feet wide shall have either intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 8 feet wide shall have truss rods or intermediate braces. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate. Stops shall be provided for holding the gates in the open position. For high security applications, each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence.

2.3 POSTS

2.3.1 Metal Posts for Chain Link Fence

ASTM F 1083, zinc-coated. Group IA, with external coating Type A steel pipe. Group IC steel pipe, zinc-coated with external coating Type A or Type B and Group II, roll-formed steel sections, shall meet the strength and coating requirements of ASTM F 1043. Group III, ASTM F 1043 steel H-section may be used for line posts in lieu of line post shapes specified for the other classes. Sizes shall be as shown on the drawings. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Gate post shall be for the gate type specified subject to the limitation specified in ASTM F 900 and/or ASTM F 1184.

2.4 BRACES AND RAILS

ASTM F 1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F 1043. Group II, formed steel sections, size 1-21/32 inch, conforming to ASTM F 1043, may be used as braces and rails if Group II line posts are furnished.

2.5 WIRE

2.5.1 Tension Wire

Tension wire shall be Type I or Type II, Class 2 coating, in accordance with ASTM A 824.

2.6 ACCESSORIES

ASTM F 626. Ferrous accessories shall be zinc or aluminum coated. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment. Barbed wire shall be 2 strand, 12-1/2 gauge wire, zinc-coated, Class 3 in accordance with ASTM A 121 or aluminum coated Type I in accordance with ASTM A 585. Barbed wire shall be four-point barbed type steel wire. Barbed wire support arms shall be the single arm type and of the design required for the post furnished. Tie wire for attaching fabric to rails, braces, and posts shall be 9 gauge steel wire and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A 153/A 153M unless modified.

2.7 CONCRETE

ASTM C 94/C 94M, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 3000 psi at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

PART 3 EXECUTION

3.1 INSTALLATION

Fence shall be installed to the lines and grades indicated. The area on either side of the fence line shall be cleared to the extent indicated. Line posts shall be spaced equidistant at intervals not exceeding 10 feet. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts; however, runs between terminal posts shall not exceed 500

feet. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A 780.

3.2 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a 2 inch clearance between the bottom of the fabric and finish grade.

3.3 POST INSTALLATION

3.3.1 Posts for Chain Link Fence

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 18 inches in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least 1 inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts.

3.4 BRACES AND TRUSS RODS

Braces and truss rods shall be installed as indicated and in conformance with the standard practice for the fence furnished.

3.5 TENSION WIRES

Tension wires shall be installed along the top and bottom of the fence line and attached to the terminal posts of each stretch of the fence. Top tension wires shall be installed within the top 4 inches of the installed fabric. Bottom tension wire shall be installed within the bottom 6 inches of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

3.6 CHAIN LINK FABRIC

Chain link fabric shall be installed on the outside of the post. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15 inch intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately 15 inch intervals and fastened to all rails and tension wires at approximately 12 inch intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 1 plus or minus 1/2 inch above the ground.

3.7 BARBED WIRE SUPPORTING ARMS AND BARBED WIRE

3.7.1 General Requirements

Barbed wire supporting arms and barbed wire shall be installed as indicated and as recommended by the manufacturer. Supporting arms shall be anchored to the posts in a manner to prevent easy removal with hand tools. Barbed wire shall be pulled taut and attached to the arms with clips or other means that will prevent easy removal.

3.8 GATE INSTALLATION

Gates shall be installed at the locations shown. Hinged gates shall be mounted to swing as indicated. Latches, stops, and keepers shall be installed as required. Padlocks shall be attached to gates or gate posts with chains. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal.

3.9 GROUNDING

Fences shall be grounded on each side of all gates, at each corner, at the closest approach to each building located within 50 feet of the fence, and where the fence alignment changes more than 15 degrees. Grounding locations shall not exceed 650 feet. Each gate panel shall be bonded with a flexible bond strap to its gate post. Fences crossed by powerlines of 600 volts or more shall be grounded at or near the point of crossing and at distances not exceeding 150 feet on each side of crossing. Ground conductor shall consist of No. 8 AWG solid copper wire. Grounding electrodes shall be 3/4 inch by 10 foot long copper-clad steel rod. Electrodes shall be driven into the earth so that the top of the electrode is at least 6 inches below the grade. Where driving is impracticable, electrodes shall be buried a minimum of 12 inches deep and radially from the fence. The top of the electrode shall be not less than 2 feet or more than 8 feet from the fence. Ground conductor shall be clamped to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric, and ground rods. After installation the total resistance of fence to ground shall not be greater than 25 ohms.

-- End of Section --

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SECTION 03200A

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-- End of Section Table of Contents --

SECTION 03200A

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 318/318R (1995) Building Code Requirements for
Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82 (1997a) Steel Wire, Plain, for Concrete
Reinforcement

ASTM A 184/A 184M (1996) Fabricated Deformed Steel Bar Mats
for Concrete Reinforcement

ASTM A 615/A 615M (1996a) Deformed and Plain Billet-Steel
Bars for Concrete Reinforcement

ASTM A 706/A 706M (1998) Low-Alloy Steel Deformed and Plain
Bars for Concrete Reinforcement

ASTM A 767/A 767M (1997) Zinc-Coated (Galvanized) Steel Bars
in Concrete Reinforcement

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4 (1998) Structural Welding Code -
Reinforcing Steel

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 1MSP (2001) Manual of Standard Practice

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement; G

Detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-03 Product Data

Welding;

A list of qualified welders names.

SD-07 Certificates

Reinforcing Steel; G

Certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

1.3 WELDING

Welders shall be qualified in accordance with AWS D1.4. Qualification test shall be performed at the worksite and the Contractor shall notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4.

1.4 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184/A 184M.

2.2 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M or ASTM A 706/A 706M, grades and sizes as indicated. Cold drawn wire used for spiral reinforcement shall conform to ASTM A 82. In highly corrosive environments or when directed by the Contracting Officer, reinforcing steel shall conform to ASTM A 767/A 767M.

2.3 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.4 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 1MSP and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding

concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318/318R. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

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SECTION 03307A

CONCRETE FOR MINOR STRUCTURES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 308	(1992; R 1997) Standard Practice for Curing Concrete
ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary
ACI 347R	(1994; R 1999) Guide to Formwork for Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 615/A 615M	(2000) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 143/C 143M	(2000) Slump of Hydraulic Cement Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 231	(1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2000e1) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999ae1) Concrete Aggregates
ASTM C 39/C 39M	(2001) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 494/C 494M	(1999ae1) Chemical Admixtures for Concrete

ASTM C 618	(2000) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 685	(2000) Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C 94/C 94M	(2000e2) Ready-Mixed Concrete
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 98	(1998) Calcium Chloride

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Air-Entraining Admixture; G
Accelerating Admixture; G
Water-Reducing or Retarding Admixture; G
Curing Materials; G
Reinforcing Steel;

Manufacturer's literature is available from suppliers which demonstrates compliance with applicable specifications for the above materials.

Batching and Mixing Equipment; G

Batching and mixing equipment will be accepted on the basis of manufacturer's data which demonstrates compliance with the applicable specifications.

Conveying and Placing Concrete;

The methods and equipment for transporting, handling, depositing, and consolidating the concrete shall be submitted prior to the first concrete placement.

Formwork;

Formwork design shall be submitted prior to the first concrete placement.

SD-06 Test Reports

Aggregates; G

Aggregates will be accepted on the basis of certificates of compliance and test reports that show the material(s) meets the quality and grading requirements of the specifications under which it is furnished.

Concrete Mixture Proportions; G

Ten days prior to placement of concrete, the contractor shall submit the mixture proportions that will produce concrete of the quality required. Applicable test reports shall be submitted to verify that the concrete mixture proportions selected will produce concrete of the quality specified.

SD-07 Certificates

Cementitious Materials; G

Certificates of compliance attesting that the concrete materials meet the requirements of the specifications shall be submitted in accordance with the Special Clause "CERTIFICATES OF COMPLIANCE". Cementitious material will be accepted on the basis of a manufacturer's certificate of compliance, accompanied by mill test reports that the material(s) meet the requirements of the specification under which it is furnished.

Aggregates; G

Aggregates will be accepted on the basis of certificates of compliance and tests reports that show the material(s) meet the quality and grading requirements of the specifications under which it is furnished.

1.3 DESIGN AND PERFORMANCE REQUIREMENTS

The Government will maintain the option to sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary to assist the Government in procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Concrete will be sampled in accordance with ASTM C 172. Slump and air content will be determined in accordance with ASTM C 143/C 143M and ASTM C 231, respectively, when cylinders are molded. Compression test specimens will be made, cured, and transported in accordance with ASTM C 31/C 31M. Compression test specimens will be tested in accordance with ASTM C 39/C 39M. Samples for strength tests will be taken not less than once each shift in which concrete is produced. A minimum of three specimens will be made from each sample; two will be tested at 28 days (90 days if pozzolan is used) for acceptance, and one will be tested at 7 days for information.

1.3.1 Strength

Acceptance test results will be the average strengths of two specimens tested at 28 days (90 days if pozzolan is used). The strength of the concrete will be considered satisfactory so long as the average of three consecutive acceptance test results equal or exceed the specified compressive strength, f'_c , and no individual acceptance test result falls below f'_c by more than 500 psi.

1.3.2 Construction Tolerances

A Class "C" finish shall apply to all surfaces except those specified to receive a Class "D" finish. A Class "D" finish shall apply to all surfaces which will be permanently concealed after construction. The surface requirements for the classes of finish required shall be as specified in ACI 347R.

1.3.3 Concrete Mixture Proportions

Concrete mixture proportions shall be the responsibility of the Contractor.

Mixture proportions shall include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic yard of concrete. All materials included in the mixture proportions shall be of the same type and from the same source as will be used on the project. Specified compressive strength f'_c shall be 4,000 psi at 28 days (90 days if pozzolan is used). The maximum nominal size coarse aggregate shall be 1-1/2 inches, in accordance with ACI 318/318R.

The air content shall be between 4.5 and 7.5 percent. The slump shall be between 2 and 5 inches. The maximum water cement ratio shall not exceed 0.50.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Cementitious materials shall conform to the appropriate specifications listed:

2.1.1.1 Portland Cement

ASTM C 150, Type I, or II.

2.1.1.2 Pozzolan

Pozzolan shall conform to ASTM C 618, Class C or F, including requirements of Tables 1A and 2A.

2.1.2 Aggregates

Aggregates shall meet the quality and grading requirements of ASTM C 33 Class Designations 4M or better.

2.1.3 Admixtures

Admixtures to be used, when required or approved, shall comply with the appropriate specification listed. Chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing shall be retested at the expense of the contractor at the request of the Contracting Officer and shall be rejected if test results are not satisfactory.

2.1.3.1 Air-Entraining Admixture

Air-entraining admixture shall meet the requirements of ASTM C 260.

2.1.3.2 Accelerating Admixture

Calcium chloride shall meet the requirements of ASTM D 98. Other accelerators shall meet the requirements of ASTM C 494/C 494M, Type C or E.

2.1.3.3 Water-Reducing or Retarding Admixture

Water-reducing or retarding admixture shall meet the requirements of ASTM C 494/C 494M, Type A, B, or D. High-range water reducing admixture Type F or G may be used only when approved, approval being contingent upon particular placement requirements as described in the Contractor's Quality Control Plan.

2.1.4 Water

Water for mixing and curing shall be fresh, clean, potable, and free from injurious amounts of oil, acid, salt, or alkali, except that unpotable water may be used if it meets the requirements of COE CRD-C 400.

2.1.5 Reinforcing Steel

Reinforcing steel bar shall conform to the requirements of ASTM A 615/A 615M, Grade 60. Details of reinforcement not shown shall be in accordance with ACI 318/318R, Chapters 7 and 12.

2.1.6 Formwork

The design and engineering of the formwork as well as its construction, shall be the responsibility of the Contractor.

2.1.7 Form Coatings

Forms for exposed surfaces shall be coated with a nonstaining form oil, which shall be applied shortly before concrete is placed.

2.1.8 Curing Materials

Curing materials shall conform to the following requirements.

2.1.8.1 Impervious Sheet Materials

Impervious sheet materials, ASTM C 171, type optional, except polyethylene film, if used, shall be white opaque.

2.1.8.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D or 2, Class A or B.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 General

Construction joints shall be prepared to expose coarse aggregate, and the surface shall be clean, damp, and free of laitance. Ramps and walkways, as necessary, shall be constructed to allow safe and expeditious access for

concrete and workmen. Snow, ice, standing or flowing water, loose particles, debris, and foreign matter shall have been removed. Earth foundations shall be satisfactorily compacted. Spare vibrators shall be available. The entire preparation shall be accepted by the Government prior to placing.

3.1.2 Embedded Items

Reinforcement shall be secured in place; joints, anchors, and other embedded items shall have been positioned. Internal ties shall be arranged so that when the forms are removed the metal part of the tie will be not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structures. Embedded items shall be free of oil and other foreign matters such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. All equipment needed to place, consolidate, protect, and cure the concrete shall be at the placement site and in good operating condition.

3.1.3 Formwork Installation

Forms shall be properly aligned, adequately supported, and mortar-tight. The form surfaces shall be smooth and free from irregularities, dents, sags, or holes when used for permanently exposed faces. All exposed joints and edges shall be chamfered, unless otherwise indicated.

3.1.4 Production of Concrete

3.1.4.1 Ready-Mixed Concrete

Ready-mixed concrete shall conform to ASTM C 94/C 94M except as otherwise specified.

3.1.4.2 Concrete Made by Volumetric Batching and Continuous Mixing

Concrete made by volumetric batching and continuous mixing shall conform to ASTM C 685.

3.1.4.3 Batching and Mixing Equipment

The contractor shall have the option of using an on-site batching and mixing facility. The facility shall provide sufficient batching and mixing equipment capacity to prevent cold joints. The method of measuring materials, batching operation, and mixer shall be submitted for review. On-site plant shall conform to the requirements of either ASTM C 94/C 94M or ASTM C 685.

3.2 CONVEYING AND PLACING CONCRETE

Conveying and placing concrete shall conform to the following requirements.

3.2.1 General

Concrete placement shall not be permitted when weather conditions prevent proper placement and consolidation without approval. When concrete is mixed and/or transported by a truck mixer, the concrete shall be delivered to the site of the work and discharge shall be completed within 1-1/2 hours or 45 minutes when the placing temperature is 85 degrees F or greater unless a retarding admixture is used. Concrete shall be conveyed from the

mixer to the forms as rapidly as practicable by methods which prevent segregation or loss of ingredients. Concrete shall be in place and consolidated within 15 minutes after discharge from the mixer. Concrete shall be deposited as close as possible to its final position in the forms and be so regulated that it may be effectively consolidated in horizontal layers 18 inches or less in thickness with a minimum of lateral movement. The placement shall be carried on at such a rate that the formation of cold joints will be prevented.

3.2.2 Consolidation

Each layer of concrete shall be consolidated by internal vibrating equipment. Internal vibration shall be systematically accomplished by inserting the vibrator through the fresh concrete in the layer below at a uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator and overlay the adjacent, just-vibrated area by a few inches. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the layer below, if such a layer exists. It shall be held stationary until the concrete is consolidated and then withdrawn slowly at the rate of about 3 inches per second.

3.2.3 Cold-Weather Requirements

No concrete placement shall be made when the ambient temperature is below 35 degrees F or if the ambient temperature is below 40 degrees F and falling. Suitable covering and other means as approved shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing and at a temperature above freezing for the remainder of the curing period. Salt, chemicals, or other foreign materials shall not be mixed with the concrete to prevent freezing. Any concrete damaged by freezing shall be removed and replaced at the expense of the contractor.

3.2.4 Hot-Weather Requirements

When the rate of evaporation of surface moisture, as determined by use of Figure 1 of ACI 308, is expected to exceed 0.2 pound per square foot per hour, provisions for windbreaks, shading, fog spraying, or covering with a light-colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow.

3.3 FORM REMOVAL

Forms shall not be removed before the expiration of 24 hours after concrete placement except where otherwise specifically authorized. Supporting forms and shoring shall not be removed until the concrete has cured for at least 5 days. When conditions on the work are such as to justify the requirement, forms will be required to remain in place for longer periods.

3.4 FINISHING

3.4.1 General

No finishing or repair will be done when either the concrete or the ambient temperature is below 50 degrees F.

3.4.2 Finishing Formed Surfaces

All fins and loose materials shall be removed, and surface defects including tie holes shall be filled. All honeycomb areas and other defects shall be repaired. All unsound concrete shall be removed from areas to be repaired. Surface defects greater than 1/2 inch in diameter and holes left by removal of tie rods in all surfaces not to receive additional concrete shall be reamed or chipped and filled with dry-pack mortar. The prepared area shall be brush-coated with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filled with mortar or concrete. The cement used in mortar or concrete for repairs to all surfaces permanently exposed to view shall be a blend of portland cement and white cement so that the final color when cured will be the same as adjacent concrete.

3.4.3 Finishing Unformed Surfaces

All unformed surfaces that are not to be covered by additional concrete or backfill shall be float finished to elevations shown, unless otherwise specified. Surfaces to receive additional concrete or backfill shall be brought to the elevations shown and left as a true and regular surface. Exterior surfaces shall be sloped for drainage unless otherwise shown. Joints shall be carefully made with a jointing tool. Unformed surfaces shall be finished to a tolerance of 3/8 inch for a float finish as determined by a 10 foot straightedge placed on surfaces shown on the plans to be level or having a constant slope. Finishing shall not be performed while there is excess moisture or bleeding water on the surface. No water or cement shall be added to the surface during finishing.

3.4.3.1 Float Finish

Surfaces to be float finished shall be screeded and darried or bullfloated to eliminate the ridges and to fill in the voids left by the screed. In addition, the darby or bullfloat shall fill all surface voids and only slightly embed the coarse aggregate below the surface of the fresh concrete. When the water sheen disappears and the concrete will support a person's weight without deep imprint, floating should be completed. Floating should embed large aggregates just beneath the surface, remove slight imperfections, humps, and voids to produce a plane surface, compact the concrete, and consolidate mortar at the surface.

3.5 CURING AND PROTECTION

Beginning immediately after placement and continuing for at least 7 days, all concrete shall be cured and protected from premature drying, extremes in temperature, rapid temperature change, freezing, mechanical damage, and exposure to rain or flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the site of the placement prior to the start of concrete placement. Preservation of moisture for concrete surfaces not in contact with forms shall be accomplished by one of the following methods:

- a. Continuous sprinkling or ponding.
- b. Application of absorptive mats or fabrics kept continuously wet.
- c. Application of sand kept continuously wet.
- d. Application of impervious sheet material conforming to ASTM C 171.

e. Application of membrane-forming curing compound conforming to ASTM C 309, Type 1-D, on surfaces permanently exposed to view and Type 2 on other surfaces shall be accomplished in accordance with manufacturer's instructions.

The preservation of moisture for concrete surfaces placed against wooden forms shall be accomplished by keeping the forms continuously wet for 7 days. If forms are removed prior to end of the required curing period, other curing methods shall be used for the balance of the curing period. During the period of protection removal, the temperature of the air in contact with the concrete shall not be allowed to drop more than 25 degrees F within a 24 hour period.

3.6 TESTS AND INSPECTIONS

3.6.1 General

The individuals who sample and test concrete as required in this specification shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I.

3.6.2 Inspection Details and Frequency of Testing

3.6.2.1 Preparations for Placing

Foundation or construction joints, forms, and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor to certify that it is ready to receive concrete.

3.6.2.2 Air Content

Air content shall be checked at least twice during each shift that concrete is placed. Samples shall be obtained in accordance with ASTM C 172 and tested in accordance with ASTM C 231.

3.6.2.3 Slump

Slump shall be checked twice during each shift that concrete is produced. Samples shall be obtained in accordance with ASTM C 172 and tested in accordance with ASTM C 143/C 143M.

3.6.2.4 Consolidation and Protection

The Contractor shall ensure that the concrete is properly consolidated, finished, protected, and cured.

3.6.3 Action Required

3.6.3.1 Placing

The placing foreman shall not permit placing to begin until he has verified that an adequate number of acceptable vibrators, which are in working order and have competent operators, are available. Placing shall not be continued if any pile is inadequately consolidated.

3.6.3.2 Air Content

Whenever a test result is outside the specification limits, the concrete

shall not be delivered to the forms and an adjustment shall be made to the dosage of the air-entrainment admixture.

3.6.3.3 Slump

Whenever a test result is outside the specification limits, the concrete shall not be delivered to the forms and an adjustment should be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the water-cement ratio does not exceed that specified in the submitted concrete mixture proportion.

3.6.4 Reports

The results of all tests and inspections conducted at the project site shall be reported informally at the end of each shift and in writing weekly and shall be delivered within 3 days after the end of each weekly reporting period. See Section 01451 CONTRACTOR QUALITY CONTROL.

-- End of Section --

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SECTION 05090A

WELDING, STRUCTURAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 335 (1989) Structural Steel Buildings
Allowable Stress Design and Plastic Design

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT RP SNT-TC-1A (2001) Recommended Practice

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4 (1998) Standard Symbols for Welding,
Brazing and Nondestructive Examination

AWS A3.0 (2001) Standard Welding Terms and
Definitions

AWS D1.1/D1.1M (2002) Structural Welding Code - Steel

AWS Z49.1 (1999) Safety in Welding, Cutting and
Allied Processes

1.2 DEFINITIONS

Definitions of welding terms shall be in accordance with AWS A3.0.

1.3 GENERAL REQUIREMENTS

The design of welded connections shall conform to AISC 335 unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Welding shall be as specified in this section, except where additional requirements are shown on the drawings or are specified in other sections. Welding shall not be started until welding procedures, inspectors, nondestructive testing personnel, welders, welding operators, and tackers have been qualified and the submittals approved by the Contracting Officer. Qualification testing shall be performed at or near the work site. Each Contractor performing welding shall maintain records of the test results obtained in welding procedure, welder, welding operator, and tacker performance qualifications.

1.3.1 Pre-erection Conference

A pre-erection conference shall be held, prior to the start of the field welding, to bring all affected parties together and to gain a naturally clear understanding of the project and the Welding Procedure Specifications (WPS) (which the Contractor shall develop and submit for all welding, including welding done using prequalified procedures). Attendees shall include all Contractor's welding production and inspection personnel and appropriate Government personnel. Items for discussion could include: responsibilities of various parties; welding procedures and processes to be followed; welding sequence (both within a joint and joint sequence within the building); inspection requirements and procedures, both visual and ultrasonic; welding schedule; fabrication of mock-up model; and other items deemed necessary by the attendees.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Welding Procedure Qualifications; G
Welder, Welding Operator, and Tacker Qualification
Inspector Qualification
Previous Qualifications
Prequalified Procedures

Copies of the welding procedure specifications; the procedure qualification test records; and the welder, welding operator, or tacker qualification test records.

SD-06 Test Reports

Quality Control

A quality assurance plan and records of tests and inspections.

1.5 WELDING PROCEDURE QUALIFICATIONS

Except for prequalified (per AWS D1.1/D1.1M) and previously qualified procedures, each Contractor performing welding shall record in detail and shall qualify the welding procedure specification for any welding procedure followed in the fabrication of weldments. Qualification of welding procedures shall conform to AWS D1.1/D1.1M and to the specifications in this section. Copies of the welding procedure specification and the results of the procedure qualification test for each type of welding which requires procedure qualification shall be submitted for approval. Approval of any procedure, however, will not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the requirements of these specifications. This information shall be submitted on the forms in Appendix E of AWS D1.1/D1.1M. Welding procedure specifications shall be individually identified and shall be referenced on the detail drawings and erection drawings, or shall be suitably keyed to the contract drawings. In case of conflict between this specification and AWS D1.1/D1.1M, this specification governs.

1.5.1 Previous Qualifications

Welding procedures previously qualified by test may be accepted for this contract without requalification if the following conditions are met:

- a. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.
- b. The qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.
- c. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

1.5.2 Prequalified Procedures

Welding procedures which are considered prequalified as specified in AWS D1.1/D1.1M will be accepted without further qualification. The Contractor shall submit for approval a listing or an annotated drawing to indicate the joints not prequalified. Procedure qualification shall be required for these joints.

1.5.3 Retests

If welding procedure fails to meet the requirements of AWS D1.1/D1.1M, the procedure specification shall be revised and requalified, or at the Contractor's option, welding procedure may be retested in accordance with AWS D1.1/D1.1M. If the welding procedure is qualified through retesting, all test results, including those of test welds that failed to meet the requirements, shall be submitted with the welding procedure.

1.6 WELDER, WELDING OPERATOR, AND TACKER QUALIFICATION

Each welder, welding operator, and tacker assigned to work on this contract shall be qualified in accordance with the applicable requirements of AWS D1.1/D1.1M and as specified in this section. Welders, welding operators, and tackers who make acceptable procedure qualification test welds will be considered qualified for the welding procedure used.

1.6.1 Previous Personnel Qualifications

At the discretion of the Contracting Officer, welders, welding operators, and tackers qualified by test within the previous 6 months may be accepted for this contract without requalification if all the following conditions are met:

- a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the specified requirements for detail drawings.
- b. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.
- c. The previously qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.

- d. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

1.6.2 Certificates

Before assigning any welder, welding operator, or tacker to work under this contract, the Contractor shall submit the names of the welders, welding operators, and tackers to be employed, and certification that each individual is qualified as specified. The certification shall state the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. The certification shall be kept on file, and 3 copies shall be furnished. The certification shall be kept current for the duration of the contract.

1.6.3 Renewal of Qualification

Requalification of a welder or welding operator shall be required under any of the following conditions:

- a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which he is qualified.
- b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these specifications.
- c. The welder or welding operator was qualified by an employer other than those firms performing work under this contract, and a qualification test has not been taken within the past 12 months. Records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified shall be submitted as evidence of conformance.
- d. A tacker who passes the qualification test shall be considered eligible to perform tack welding indefinitely in the positions and with the processes for which he is qualified, unless there is some specific reason to question the tacker's ability. In such a case, the tacker shall be required to pass the prescribed tack welding test.

1.7 INSPECTOR QUALIFICATION

Inspector qualifications shall be in accordance with AWS D1.1/D1.1M. Nondestructive testing personnel shall be qualified in accordance with the requirements of ASNT RP SNT-TC-1A for Levels I or II in the applicable nondestructive testing method. The inspector may be supported by assistant welding inspectors who are not qualified to ASNT RP SNT-TC-1A, and assistant inspectors may perform specific inspection functions under the supervision of the qualified inspector.

1.8 SYMBOLS

Symbols shall be in accordance with AWS A2.4, unless otherwise indicated.

1.9 SAFETY

Safety precautions during welding shall conform to AWS Z49.1.

PART 2 PRODUCTS

2.1 WELDING EQUIPMENT AND MATERIALS

All welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures. All welding equipment and materials shall comply with the applicable requirements of AWS D1.1/D1.1M.

PART 3 EXECUTION

3.1 WELDING OPERATIONS

3.1.1 Requirements

Workmanship and techniques for welded construction shall conform to the requirements of AWS D1.1/D1.1M and AISC 335. When AWS D1.1/D1.1M and the AISC 335 specification conflict, the requirements of AWS D1.1/D1.1M shall govern.

3.1.2 Identification

Welds shall be identified in one of the following ways:

- a. Written records shall be submitted to indicate the location of welds made by each welder, welding operator, or tacker.
- b. Each welder, welding operator, or tacker shall be assigned a number, letter, or symbol to identify welds made by that individual. The Contracting Officer may require welders, welding operators, and tackers to apply their symbol next to the weld by means of rubber stamp, felt-tipped marker with waterproof ink, or other methods that do not cause an indentation in the metal. For seam welds, the identification mark shall be adjacent to the weld at 3 foot intervals. Identification with die stamps or electric etchers shall not be allowed.

3.2 QUALITY CONTROL

Testing shall be done by an approved inspection or testing laboratory or technical consultant; or if approved, the Contractor's inspection and testing personnel may be used instead of the commercial inspection or testing laboratory or technical consultant. The Contractor shall perform visual inspection to determine conformance with paragraph STANDARDS OF ACCEPTANCE. Procedures and techniques for inspection shall be in accordance with applicable requirements of AWS D1.1/D1.1M.

3.3 STANDARDS OF ACCEPTANCE

Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of AWS D1.1/D1.1M and the contract drawings. Nondestructive testing shall be by visual inspection methods. The minimum extent of nondestructive testing shall be random 10 percent of welds or joints, as indicated on the drawings.

3.3.1 Nondestructive Examination

The welding shall be subject to inspection and tests in the mill, shop, and field. Inspection and tests in the mill or shop will not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality. When materials or workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment.

3.3.2 Destructive Tests

When metallographic specimens are removed from any part of a structure, the Contractor shall make repairs. The Contractor shall employ qualified welders or welding operators, and shall use the proper joints and welding procedures, including peening or heat treatment if required, to develop the full strength of the members and joints cut and to relieve residual stress.

3.4 GOVERNMENT INSPECTION AND TESTING

In addition to the inspection and tests performed by the Contractor for quality control, the Government will perform inspection and testing for acceptance to the extent determined by the Contracting Officer. The costs of such inspection and testing will be borne by the Contractor if unsatisfactory welds are discovered, or by the Government if the welds are satisfactory. The work may be performed by the Government's own forces or under a separate contract for inspection and testing. The Government reserves the right to perform supplemental nondestructive and destructive tests to determine compliance with paragraph STANDARDS OF ACCEPTANCE.

3.5 CORRECTIONS AND REPAIRS

When inspection or testing indicates defects in the weld joints, the welds shall be repaired using a qualified welder or welding operator as applicable. Corrections shall be in accordance with the requirements of AWS D1.1/D1.1M and the specifications. Defects shall be repaired in accordance with the approved procedures. Defects discovered between passes shall be repaired before additional weld material is deposited. Wherever a defect is removed and repair by welding is not required, the affected area shall be blended into the surrounding surface to eliminate sharp notches, crevices, or corners. After a defect is thought to have been removed, and before rewelding, the area shall be examined by suitable methods to ensure that the defect has been eliminated. Repair welds shall meet the inspection requirements for the original welds. Any indication of a defect shall be regarded as a defect, unless reevaluation by nondestructive methods or by surface conditioning shows that no unacceptable defect is present.

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SECTION 05120

STRUCTURAL STEEL

PART 4 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program Description
AISC M018L	(1994) LRFD Manual of Steel Construction Volume I
AISC M019L	(1994) LRFD Manual of Steel Construction Volume II
AISC 810	(1997) Erection Bracing of Low-Rise Structural Steel Frames
AISC 316	(1989) ASD Manual of Steel Construction
AISC 317	(1992; Errata 1994) Connections
AISC 325	LRFD Manual of Steel Construction
AISC 326	(2002) Detailing for Steel Construction
AISC 303	(2000) Steel Buildings and Bridges
AISC 348	(2000) Structural Joints Using ASTM A325 or A490 Bolts
AISC 335	(1989) Structural Steel Buildings Allowable Stress Design and Plastic Design
AISC S340	(1992) Metric Properties of Structural Shapes with Dimensions According to ASTM A6M
AISC 341	(1997) Seismic Provisions for Structural Steel Buildings
AISC 350	(1999) Load and Resistance Factor Design Specification for Structural Steel Buildings

ASME INTERNATIONAL (ASME)

ASME B46.1 (2002) Surface Texture, (Surface Roughness, Waviness, and Lay)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M (2002) Carbon Structural Steel

ASTM A 53 (2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

ASTM A 123/A 123M (2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 143 (2003) Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement

ASTM A 153/A 153M (2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 325 (2002) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

ASTM A 490 (2002) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

ASTM A 563 (2000) Carbon and Alloy Steel Nuts

ASTM A 572/A 572M (2003) High-Strength Low-Alloy Columbium-Vanadium of Structural Steel

ASTM A 780 (2001) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM A 992/A 992M (2002) Structural Steel Shapes

ASTM B 695 (2000) Coatings of Zinc Mechanically Deposited on Iron and Steel

ASTM C 827 (2001; Rev A) Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures

ASTM C 1107 (2002) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

ASTM F 436 (2002) Hardened Steel Washers

ASTM F 959 (2002) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4 (1998) Standard Symbols for Welding, Brazing and Nondestructive Examination

AWS D1.1/D1.1M (2002) Structural Welding Code - Steel

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP 3 (1982; R 2000) Power Tool Cleaning

SSPC SP 6 (2000) Commercial Blast Cleaning

SSPC PA 1 (2000) Shop, Field, and Maintenance
Painting

1.2 SYSTEM DESCRIPTION

Provide the structural steel system, including galvanizing, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing shall be provided in accordance with AISC 316 and AISC 317 or AISC 325 except as modified in this contract.

1.3 MODIFICATIONS TO REFERENCES

In AISC 316, AISC 317, AISC 335, AISC 303, AISC 348, and AISC S340, except as modified in this section, shall be considered a part of AISC 316 and AISC 317 and is referred to in this section as AISC 316 and AISC 317.

In AISC 325, AISC 350, AISC 303, AISC 348, and AISC S340, except as modified in this section, shall be considered a part of AISC M018L and AISC M019L and is referred to in this section as AISC 325.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Erection Plan, including description of temporary supports; G

Fabrication drawings including description of connections; G

SD-03 Product Data

Load indicator washers

Load indicator bolts

SD-06 Test Reports

Class B coating

Bolts, nuts, and washers

Supply the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

SD-07 Certificates

Steel

Bolts, nuts, and washers

Welding electrodes and rods

Nonshrink grout

Galvanizing

AISC Quality Certification

Welding procedures and qualifications

1.5 AISC QUALITY CERTIFICATION

Work shall be fabricated in an AISC certified Category Sbd fabrication plant.

1.6 SEISMIC PROVISIONS

In addition to AISC 325, the structural steel system shall be provided in accordance with AISC 341.

1.7 QUALITY ASSURANCE

1.7.1 Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 326, AISC 316 and AISC 317. Drawings shall not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS A2.4 standard welding symbols. Shoring and temporary bracing shall be designed and sealed by a registered professional engineer and submitted for record purposes as part of the drawings.

1.7.2 Certifications

1.7.2.1 Erection Plan

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing, and a detailed sequence of welding, including each welding procedure required.

1.7.2.2 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate shall be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

PART 2 PRODUCTS

2.1 STEEL

2.1.1 Structural Steel

ASTM A 36/A 36M.

2.1.2 High-Strength Structural Steel

2.1.2.1 Low-Alloy Steel

ASTM A 572/A 572M , Grade 50. ASTM A 992/A 992M .

2.1.3 Structural Shapes for Use in Building Framing

Wide flange shapes, ASTM A 992/A 992M.

2.1.4 Steel Pipe

ASTM A 53, Type E or S, Grade B, weight class STD (Standard).

2.2 BOLTS, NUTS, AND WASHERS

Provide the following unless indicated otherwise.

2.2.1 Structural Steel , Steel Pipe

2.2.1.1 Bolts

ASTM A 325, Type 1. The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

2.2.1.2 Nuts

ASTM A 563, Grade and Style for applicable ASTM bolt standard recommended.

2.2.1.3 Washers

ASTM F 436 washers for ASTM A 325 and ASTM A 490 bolts.

2.2.2 High-Strength Structural Steel

2.2.2.1 Bolts

ASTM A 325, Type 1.

2.2.2.2 Nuts

ASTM A 563, Grade and Style as specified in the applicable ASTM bolt standard.

2.2.2.3 Washers

ASTM F 436, plain carbon steel.

2.2.3 Foundation Anchorage

2.2.3.1 Bolts

ASTM A 325.

2.2.3.2 Nuts

ASTM A 563, Grade A, hex style.

2.2.3.3 Washers

ASTM F 436.

2.2.4 Load Indicator Washers

ASTM F 959. Provide ASTM B 695, Class 50, Type 1 galvanizing.

2.2.5 Load Indicator Bolts

ASTM A 325, Type 1, with a manufactured notch between the bolt tip and threads. The bolt shall be designed to react to the opposing rotational torques applied by the installation wrench, with the bolt tip automatically shearing off when the proper tension is obtained.

2.2.6 Self-Locking Nuts

Provide nuts with a locking pin set in the nut. The locking pin shall slide along the bolt threads, and by reversing the direction of the locking pin, the nut shall be removed without damaging the nut or bolt. Provide stainless steel locking pins.

2.3 STRUCTURAL STEEL ACCESSORIES

2.3.1 Welding Electrodes and Rods

AWS D1.1/D1.1M.

2.3.2 Nonshrink Grout

ASTM C 1107, with no ASTM C 827 shrinkage. Grout shall be nonmetallic.

2.4 GALVANIZING

ASTM A 123/A 123M or ASTM A 153/A 153M, as applicable, unless specified otherwise galvanize after fabrication where practicable.

2.5 FABRICATION

2.5.1 Markings

Prior to erection, members shall be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

2.5.2 Shop Primer

Shop prime structural steel, except as modified herein, in accordance with SSPC PA 1. Do not prime steel surfaces embedded in concrete, galvanized surfaces, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking is to be welded). Slip critical surfaces shall be primed with a Class B coating. Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Contracting Officer.

2.5.2.1 Cleaning

SSPC SP 6, except steel exposed in spaces above ceilings, attic spaces, furred spaces, and chases that will be hidden to view in finished construction may be cleaned to SSPC SP 3 when recommended by the shop primer manufacturer. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

2.5.2.2 Primer

Apply primer to a minimum dry film thickness of 2.0 mil except provide the Class B coating for slip critical joints in accordance with the coating manufacturer's recommendations. Repair damaged primed surfaces with an additional coat of primer.

2.5.3 Surface Finishes

ASME B46.1 maximum surface roughness of 125 for pin, pinholes, and sliding bearings, unless indicated otherwise.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC 316. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC FCD for Category Sdb structural steelwork. Compression joints depending on contact bearing shall have a surface roughness not in excess of 500 micro inches as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M. Structural steelwork shall be galvanized.

3.2 INSTALLATION

3.3 ERECTION

- a: Erection of structural steel, except as indicated in item b. below, shall be in accordance with the applicable provisions of AISC 316 or AISC 325 and endorsement F of AISC FCD. Erection plan shall be reviewed, stamped and sealed by a licensed structural engineer.
- b. For low-rise structural steel buildings (60 feet tall or less and a maximum of 2 stories), the erection plan shall conform to AISC 303 and the structure shall be erected in accordance with AISC 810.

Provide for drainage in structural steel. After final positioning of steel

members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

3.3.1 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

3.4 CONNECTIONS

Except as modified in this section, connections not detailed shall be designed in accordance with AISC 335 or AISC 350. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Punch, subpunch and ream, or drill bolt [and pin] holes. Bolts, nuts, and washers shall be clean of dirt and rust, and lubricated immediately prior to installation.

3.4.1 High-Strength Bolts

ASTM A 325 bolts shall be fully tensioned to 70 percent of their minimum tensile strength. Provide load indicator bolts or washers in all ASTM A 325M bolted connections. Direct tension indicator tightening, or installation of alternate design fasteners, shall be the only acceptable tightening methods. Bolts shall be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, bolts shall then be fully tensioned, progressing from the most rigid part of a connection to the free edges.

3.4.1.1 Installation of Load Indicator Washers (LIW)

ASTM F 959. Where possible, the LIW shall be installed under the bolt head and the nut shall be tightened. If the LIW is installed adjacent to the turned element, provide a flat ASTM F 436 washer between the LIW and nut when the nut is turned for tightening, and between the LIW and bolt head when the bolt head is turned for tightening. In addition to the LIW, provide flat ASTM F 436 washers under both the bolt head and nut when ASTM A 490 bolts are used.

3.5 WELDING

AWS D1.1/D1.1M. Provide AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

The contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

3.5.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

3.6 GALVANIZING REPAIR

Provide as indicated or specified. Galvanize after fabrication where practicable. Repair damage to galvanized coatings using ASTM A 780 zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been

applied.

3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. The Contracting Officer shall be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of weld inspection.

3.7.1 Welds

3.7.1.1 Visual Inspection

AWS D1.1/D1.1M. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet weld end returns.

3.7.1.2 Nondestructive Testing

AWS D1.1/D1.1M. Test locations shall be selected by the Contracting Officer. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be tested by radiographic or ultrasonic testing, as approved by the Contracting Officer. When all welds made by an individual welder are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

3.7.2 Load Indicator Washers

3.7.2.1 Load Indicator Washer Compression

Load indicator washers shall be tested in place to verify that they have been compressed sufficiently to provide the 0.015 inch gap when the load indicator washer is placed under the bolt head and the nut is tightened, and to provide the 0.005 inch gap when the load indicator washer is placed under the turned element, as required by ASTM F 959.

3.7.2.2 Load Indicator Gaps

In addition to the above testing, an independent testing agency as approved by the Contracting Officer, shall test in place the load indicator gaps on 20 percent of the installed load indicator washers to verify that the ASTM F 959 load indicator gaps have been achieved. If more than 10 percent of the load indicators tested have not been compressed sufficiently to provide the average gaps required by ASTM F 959, then all in place load indicator washers shall be tested to verify that the ASTM F 959 load indicator gaps have been achieved. Test locations shall be selected by the Contracting Officer.

3.7.3 High-Strength Bolts

3.7.3.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions

specified in AISC 348, Table 4, depending on bolt size and grade. The bolt tension shall be developed by tightening the nut. A representative of the manufacturer or supplier shall be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements.

3.7.3.2 Inspection

Inspection procedures shall be in accordance with AISC 348, Section 9. Confirm and report to the Contracting Officer that the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration, and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

3.7.3.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension requirements. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations shall be selected by the Contracting Officer. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, shall be tested. Retest new bolts after installation.

3.7.4 Testing for Embrittlement

ASTM A 143 for steel products hot-dip galvanized after fabrication.

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SECTION 05500A

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SECTION 05500A

MISCELLANEOUS METAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M (2001) Zinc (Hot-Dip Galvanized) Coatings
on Iron and Steel Products

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2000) Structural Welding Code - Steel

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Miscellaneous Metal Items;

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items:

Fabrication drawings of steel stairs; G

Floor gratings, installation drawings; G

Handrails, installation drawings; G

1.3 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1/D1.1M. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123/A 123M, ASTM A 653/A 653M, or ASTM A 924/A 924M, as applicable. Exposed fastenings shall be compatible materials, shall generally match in

color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.4 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

1.5 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.6 ANCHORAGE

Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

1.7 SHOP PAINTING

Surfaces of ferrous metal except galvanized surfaces, shall be cleaned and shop coated with the manufacturer's standard protective coating unless otherwise specified. Surfaces of items to be embedded in concrete shall not be painted. Items to be finish painted shall be prepared according to manufacturer's recommendations or as specified.

PART 2 PRODUCTS

2.1 MISCELLANEOUS

Miscellaneous plates and shapes for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings, and frames, shall be provided to complete the work.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

All items shall be installed at the locations shown and according to the manufacturer's recommendations. Items listed below require additional procedures as specified.

-- End of Section --

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SECTION 16311

MAIN ELECTRIC SUPPLY STATION AND SUBSTATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C29.1	(1988; R 2002) Test Methods for Electrical Power Insulators
ANSI C29.2	(1992; R 1999) Insulators - Wet-Process Porcelain and Toughened Glass - Suspension Type
ANSI C29.9	(1983; R 2002) Wet-Process Porcelain Insulators - Apparatus, Post-Type
ANSI C37.16	(2000) Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors - Preferred Ratings, Related Requirements, and Application Recommendations
ANSI C37.32	(2002) High-Voltage Switches, Bus Supports, and Accessories - Schedules of Preferred Ratings, Construction Guidelines and Specifications
ANSI C37.46	(2000) For High Voltage Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2001a) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus
ASTM B 231/B 231M	(1999) Concentric-Lay-Stranded Aluminum 1350 Conductors
ASTM D 923	(1997) Sampling Electrical Insulating

Liquids

ASTM D 1654	(1992; R 2000) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2472	(2000) Sulfur Hexafluoride
ASTM D 4059	(2000) Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography
ASTM F 883	(1990) Padlocks

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code
IEEE C37.081	(1981) Guide for Synthetic Fault Testing of AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
IEEE C37.09	(1999) Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
IEEE C37.13	(1990; R 1995) Low-Voltage AC Power Circuit Breakers Used in Enclosures
IEEE C37.34	(1994) Test Code for High-Voltage Air Switches
IEEE C37.41	(2000) Design Tests for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories
IEEE C37.60	(1981) Requirements for Overhead, Pad Mounted, Dry Vault and Submersible Automatic Circuit Reclosers and Fault Interrupters for AC Systems
IEEE C37.90.1	(2002) Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
IEEE C37.98	(1987) Seismic Testing of Relays
IEEE C57.12.00	(2000) General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.13	(1993) Requirements for Instrument Transformers
IEEE C57.15	(1999) Requirements, Terminology, and Test Code for Step-Voltage Regulators
IEEE C57.93	(1995) Guide for Installation of

Liquid-Immersed Power Transformers

IEEE C62.1	(1989; R 1994) Surge Arresters for AC Power Circuits
IEEE C62.2	(1987; R 1994) Guide for the Application of Gapped Silicon-Carbide Surge Arresters for Alternating Current Systems
IEEE C62.11	(1999) Metal-Oxide Surge Arresters for Alternating Current Power Circuits (
IEEE Std 100	(2000) IEEE Standard Dictionary of Electrical and Electronics Terms
IEEE Std 32	(1972) Requirements, Terminology, and Test Procedures for Neutral Grounding Devices
IEEE Std 80	(2000) Safety in AC Substation Grounding
IEEE Std 81	(1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1)Normal Measurements
IEEE Std 242	(2001) Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems - Buff Book
IEEE Std 399	(1997) Recommended Practice for Power Systems Analysis - Brown Book
IEEE Std 485	(1997) Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications
IEEE Std 525	(1992) Design and Installation of Cable Systems in Substations

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA LA 1	(1992; R 1999) Surge Arresters
NEMA PB 1	(2000) Panelboards
NEMA SG 2	(1993) High Voltage Fuses
NEMA SG 3	(1995) Power Switching Equipment

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
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UNDERWRITERS LABORATORIES (UL)

UL 6	(2000; Rev thru May 2003) Rigid Metal
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Conduit

UL 50	(1995; Rev thru Nov 1999) Enclosures for Electrical Equipment
UL 67	(1993; Rev thru Feb 2003) Panelboards
UL 467	(1993; Rev thru Feb 2001) Grounding and Bonding Equipment

1.2 GENERAL REQUIREMENTS

1.2.1 Terminology

Terminology used in this specification is as defined in IEEE Std 100.

1.2.2 System Description

The system shall be configured as specified, and shall include structures, incoming and outgoing lines, transformers, regulators, fuses, circuit breakers, switches, and appurtenances to provide a fully functional system.

1.2.3 Service Conditions

Items provided under this section shall be specifically suitable for the following service conditions.

b. Ambient Temperature -40 to 100 degrees F

c. Frequency 60 Hz

1.2.4 Incoming and Outgoing Circuit Compliance

Aerial line circuits shall comply with the requirements of Section 16370 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL. Underground circuits shall comply with the requirements of Section 16375 ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G, DO

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams, and other information necessary to define the installation shall be submitted. Detail drawings shall show the ratings of items and systems and how the components of an item and system are assembled, function together, and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the

same equipment or system are not acceptable except where prior approval has been obtained from the Contracting Officer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall show physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. Optional items shall be clearly identified as included or excluded. Detail drawings shall as a minimum include:

- a. Incoming line and station bus structures and integral equipment.
- b. Transformer.
- c. Battery system including calculations for the battery and charger.
- d. Station single line electrical diagrams including primary, metering, sensing and relaying, control wiring, and control logic.

Structural drawings shall be prepared to show the structural or physical features of major items of station equipment and components of equipment or equipment assemblies and structures, including foundations or other types of supports for equipment and conductors. Those drawings shall include accurately scaled or dimensioned outline and arrangement or layout drawings to show the physical size of station equipment and component parts of the equipment and the relative arrangement of components and any physical connection of related components. Weights of equipment and components of equipment assemblies shall be provided when required to verify the adequacy of design and proposed construction of foundations or other types of supports. Dynamic forces shall be stated for switching devices when such forces must be considered in the design of support structures. The appropriate detail drawings shall show the provisions for leveling, anchoring, and connecting all items of station equipment during installation, and shall include any recommendations made by the manufacturer of the equipment.

Electrical drawings shall include single-line and three-line diagrams of the station and station equipment, schematics or elementary diagrams of each electrical system; internal wiring and external connection diagrams of each electrical device when published by the manufacturer; wiring diagrams of cabinets, panels, units, or other separate mountings; interconnection diagrams that show the wiring between separate components of assemblies; external connection diagrams that show the termination of wiring routed between separate items of station equipment; internal wiring diagrams of equipment showing wiring as actually provided for this project. External wiring connections shall be clearly identified.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures, including changes in related portions of the project and the reasons therefore, shall be submitted with the detail drawings. Approved

departures shall be made at no additional cost to the Government.

As-Built Drawings; G, RO

The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings as well as all deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily.

The as-built drawings shall be a full sized set of prints marked to reflect all deviations, modifications, and changes. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor.

SD-03 Product Data

Support Structures; G, DO

Manufacturer's design analysis and calculations for structures, foundations, anchor bolts, and supports differing from those indicated in the contract drawings, and for prefabricated structures. Calculations shall be made by a registered professional engineer with demonstrated experience in substation structural design in the last three years. The manufacturer shall provide a list of projects complete with points of contact, addresses and telephone numbers.

Fault Current Analysis; G, DO

Coordination Study; G, DO

The study shall be submitted along with protective device equipment submittals. No time extensions or similar contract modifications will be granted for work arising out of the requirements for this study. Approval of protective devices proposed shall be based on recommendations of this study. The Government shall not be held responsible for any changes to equipment, device ratings, settings, or additional labor for installation of equipment or devices ordered and/or procured prior to approval of the study.

Battery; G, DO

Calculations for the battery and associated charger indicating the basis used in defining loads, selecting cell types, and determining the battery ampere-hour capacity and physical size. Calculations shall be provided to determine capacity for the battery charger and be similar to those shown in the Appendix to

IEEE Std 485, including explanatory data. Calculations for the battery-charger shall demonstrate that the output voltage and current provided are adequate to comply with the preceding requirements.

Nameplates; G, DO

Submit data composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents.

Material and Equipment; G, DO

A complete itemized listing of equipment and materials proposed for incorporation into the work shall be submitted. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each such item.

General Installation Requirements; G, RO

As a minimum, the Contractor shall submit installation procedures for station buses and insulators, station structures, transformers, switchgear, battery system, voltage regulators and grounding resistors.

Procedures shall include diagrams, instructions, and precautions required to install, adjust, calibrate, and test the devices and equipment.

Onsite Tests; G, DO

A detailed description of the Contractor's proposed procedures for on-site tests.

SD-06 Test Reports

Factory Tests; G, DO

Six copies of the information described below in 8 1/2 x 11 inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

- a. A list of all equipment used, with calibration certifications.
- b. A copy of all measurements taken.
- c. The dates of testing.
- d. The equipment and values to be verified.
- e. The condition specified for the test.
- f. The test results, signed and dated.
- g. A description of all adjustments made.

Field Testing; G, DO

A detailed description of the Contractor's proposed procedures for on-site tests submitted 30 days prior to testing the installed system. No field test will be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

Field Test Reports; G, DO

Six copies of the information described below in 8 1/2 x 11 inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

- a. A list of all equipment used, with calibration certifications.
- b. A copy of all measurements taken.
- c. The dates of testing.
- d. The equipment and values verified.
- e. The condition specified for the test.
- f. The test results, signed and dated.
- g. A description of all adjustments made.
- h. Final position of controls, and device settings.

SD-07 Certificates

Material and Equipment

Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories, Inc., (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), the Contractor shall submit proof that the items provided under this section of the specifications conform to such requirements. The label of, or listing by, UL will be acceptable evidence that the items conform thereto. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable evidence that the item conforms thereto. A similar certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable evidence that the item conforms thereto. In lieu of such certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have

been tested and that they conform to the requirements listed, including methods of testing of the specified agencies. Compliance with above-named requirements does not relieve the Contractor from compliance with any other requirements of the specifications.

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G, DO

Six copies of operation and maintenance manuals, within 7 calendar days following the completion of tests and including assembly, installation, operation and maintenance instructions, spare parts data which provides supplier name, current cost, catalog order number, and a recommended list of spare parts to be stocked. Manuals shall also include data outlining detailed procedures for system startup and operation, and a troubleshooting guide which lists possible operational problems and corrective action to be taken. A brief description of all equipment, basic operating features, and routine maintenance requirements shall also be included. Documents shall be bound in a binder marked or identified on the spine and front cover. A table of contents page shall be included and marked with pertinent contract information and contents of the manual. Tabs shall be provided to separate different types of documents, such as catalog ordering information, drawings, instructions, and spare-parts data. Index sheets shall be provided for each section of the manual when warranted by the quantity of documents included under separate tabs or dividers.

Three additional copies of the instructions manual within 30 days following the approval of the manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers shall be stored in accordance with the manufacturer's requirements.

1.5 EXTRA MATERIALS

One additional spare fuse or fuse element for each furnished fuse or fuse element shall be delivered to the Contracting Officer when the electrical system is accepted. Two complete sets of all special tools required for maintenance shall be provided, complete with a suitable tool box. Special tools are those that only the manufacturer provides, for special purposes (to access compartments, or operate, adjust, or maintain special parts). All spare parts shall be delivered to the city of Wakefield.

PART 2 PRODUCTS

Products shall conform to the following requirements. Items of the same classification shall be identical including equipment, assemblies, parts, and components. Products for aerial construction shall conform to IEEE C2 for heavy loading districts, Grade B construction.

2.1 STANDARD PRODUCT

Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.2 NAMEPLATES

2.2.1 General

Each major component of this specification shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a nameplate securely attached to the equipment. Nameplates shall be made of noncorrosive metal. As a minimum, nameplates shall be provided for transformers, regulators, circuit breakers, capacitors, meters, switches, switchgear, and grounding resistors.

2.2.2 Liquid-Filled Transformer Nameplates

Power transformer shall be provided with Nameplate C information in accordance with IEEE C57.12.00. Nameplates shall indicate the number of gallons and composition of liquid-dielectric, and shall be permanently marked with a statement that the transformer dielectric to be supplied is non-polychlorinated biphenyl. If transformer nameplate is not so marked, the Contractor shall furnish manufacturer's certification for each transformer that the dielectric is non-PCB classified, with less than 50 ppm PCB content in accordance with paragraph MISCELLANEOUS Liquid Dielectrics. Certifications shall be related to serial numbers on transformer nameplates. Transformer dielectric exceeding the 50 ppm PCB content or transformers without certification will be considered as PCB insulated and will not be accepted.

2.3 CORROSION PROTECTION

2.3.1 Aluminum Materials

Aluminum shall not be used.

2.3.2 Ferrous Metal Materials

2.3.2.1 Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M.

2.3.2.2 Equipment

Equipment and component items, including but not limited to transformer stations and ferrous metal luminaires not hot-dip galvanized or porcelain enamel finished, shall be provided with corrosion-resistant finishes which shall withstand 120 hours of exposure to the salt spray test specified in ASTM B 117 without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch from the test mark. The scribed test mark and test evaluation shall be in accordance with ASTM D 1654 with a rating of not less than 7 in accordance with TABLE 1, (procedure A). Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard.

2.3.3 Finishing

Painting required for surfaces not otherwise specified and finish painting of items only primed at the factory shall be as specified in Section 09900 PAINTING, GENERAL.

2.4 STATION ARRANGEMENT

The substation shall be of the substation transformer type with an open-type bus-and-switch arrangement.

2.4.1 Support Structures

Structures shall be provided as shown to support incoming line conductors, switches, instrument transformers, air terminals and aerial buses. Steel structural items shall conform to Section 05120 STRUCTURAL STEEL. The elevated substation steel structure shall be as required on the structural design drawings and in the structural specifications, unless otherwise noted. General configurations for the electrical equipment is indicated. Exact dimensions and arrangements may be varied, dependent upon site limitations, to permit use of a manufacturer's standard equipment and structures. Air terminals, not less than 6 feet in length, shall be provided on each structure column for lightning protection.

2.4.2 Conductors

Conductors shall be copper with sizes as indicated, and shall comply with IEEE Std 525. Other bus shapes for electrical conductors may be used if detail drawing submittals indicate equivalent ampacity and strength. Short connections, consisting of bare stranded conductors of equivalent bus ampacity, may be used between incoming line conductors and buses or between buses and equipment. Copper flexible braid expansion couplers shall be installed in bus runs where required to allow for expansion and contraction, and at all connections to transformer bushings.

2.4.2.1 Suspension Insulators

Suspension insulators shall be provided for dead-end incoming line conductors. Suspension insulator strings and string supports shall provide a mechanical strength exceeding the ultimate strength of each dead-end conductor. Minimum ratings of suspension insulators shall be not less than ANSI C29.2 Class 52-3 or 52-4, as indicated on the drawings. Each suspension string shall have not less than 2 insulators in tandem.

2.4.2.2 Apparatus Post Insulators

Apparatus post insulators shall be provided to support conductors, and their mechanical strength shall exceed the ultimate strength of the conductor supported and, where necessary, high-strength or ultra high-strength insulators shall be provided. Minimum ratings of apparatus post insulators shall be not less than ANSI C29.9, Technical Reference Number 225.

2.5 INCOMING SWITCHING/CIRCUIT INTERRUPTING EQUIPMENT

Incoming line switching equipment shall be of the outdoor weatherproof type. Operating characteristics and ratings of incoming line switching equipment shall be as indicated.

2.5.1 Power Fuse Disconnecting Units

Incoming line power fuse disconnecting units, consisting of power fuses and fuse disconnecting switches, shall comply with NEMA SG 2. Expulsion-type power disconnecting units and fuses shall have ratings in accordance with ANSI C37.46.

2.5.1.1 Power Fuse Disconnecting Unit Ratings

Power disconnecting units shall have ratings as follows:

Nominal voltage.....	34.5 KV
Rated maximum voltage.....	38 KV
Maximum symmetrical interrupting capacity.....	6,700
Rated continuous current.....	100E
BIL.....	200

2.5.1.2 Construction

Units shall be suitable for outdoor use and shall be of the stick (hook) operated, disconnecting, single-pole, single-throw, drop-out, vertical-offset type. Fuses shall have visible blown-fuse indicators. All ratings shall be clearly visible. Units shall be suitable for mounting as indicated.

2.5.1.3 E-Rated, Current-Limiting Power Fuses

E-rated, current limiting, power fuses shall conform to ANSI C37.46.

2.5.1.4 Additional Requirements

At least one fuse tong or other fuse removal and replacement device of sufficient length, and suitable design and voltage rating, shall be provided for disconnection and replacement of fuses, and where units mounted at different elevations require different lengths, additional devices shall be provided as necessary. One set of any special tools, necessary for servicing the unit, shall be provided.

2.6 SUBSTATION EQUIPMENT

The installation shall be of the substation transformer type. The initial capacity of the substation is based on the self-cooled transformer capacity shown. The number of outgoing lines shall be as shown. Outgoing circuits shall be three-phase four-wire type with a bare neutral having a voltage rating of 4.16 kV phase-to-phase. Outgoing circuit equipment shall be rated for a nominal voltage class of 15 kV and shall have a BIL of not less than 110 kV. Outgoing circuits shall leave the station aerially.

2.6.1 Power Transformer

The power transformer will be supplied by others and shall be installed by the Contractor.

2.6.2 Control Power Transformer

Transformers shall comply with IEEE C57.12.00 for general requirements. Control power transformers shall be of the outdoor type, mineral-oil-insulated single-phase and have two separate windings per phase. Transformers shall be provided with necessary auxiliary mounting devices suitable for the indicated installation. Transformers shall have two 2-1/2 percent rated kVA high-voltage taps above and below rated primary voltage. Transformer installations shall include one primary fuse cutout and one surge arrester for each ungrounded phase conductor. Self-protected transformers are not acceptable. Transformer tanks shall have a standard gray finish.

2.6.3 Fuse Cutouts

Medium-voltage fuses and cutouts shall comply with NEMA SG 2 and shall be of the loadbreak open type construction rated 15 kV and of the ratings and types indicated. Open-link cut-outs are not acceptable. Fuses shall be either indicating or dropout type. Fuse ratings shall be as indicated. Fuse cutouts shall be equipped with mounting brackets suitable for the indicated installations.

2.6.4 Automatic Circuit Reclosers

Automatic circuit reclosers shall comply with IEEE C37.60 and shall be outdoor vacuum type, complete with state-of-the-art electronic controller and devices, attachments, and accessories required for installation and operation and shall be suitable for mounting in a substation. Each recloser shall have continuous current, minimum tripping current, interrupting current, and making current ratings and reclosure times as indicated and shall be rated for the voltage and phase of the system in which it is installed. Three-phase lockout shall be provided on three-phase circuits. Reclosers shall include provisions for a sequence of not less than three automatic reclosing operations unless otherwise noted, followed by lockout if the circuit fault persists, and for manual opening, closing, and lockout. Operating sequence shall be adjustable for 1, 2, 3, and 4 operations to lockout and for combinations of instantaneous operations followed by time delay openings to secure coordination with other reclosers and fuses in the medium-voltage distribution system. Reclosers shall automatically reset within a definite time interval after a successful reclosure and shall be supplied with devices needed to provide the necessary operating power. Surge arrester protection shall be provided. Reclosers shall be equipped with ground fault tripping and three-phase current metering equipment.

2.6.5 Overhead Switches

Nonfused switches shall be single-pole, manual devices with a continuous current rating of 600 amperes rms, a momentary asymmetrical current rating of as shown, and shall be rated for the voltage of the system in which it is installed.

2.6.6 Recloser Bypass Disconnect Switches

2.6.6.1 Ratings

Ratings at 60 Hz shall be in accordance with ANSI C37.32 and as follows:

Nominal voltage.....14.4 KV

Rated maximum voltage.....17.0 KV
Rated continuous current (switch).....600 amperes
Maximum asymmetrical momentary capacity (switch).....40,000 amperes
Maximum current (fuse).....200E
Maximum symmetrical interrupting capacity (fuse).....14,000 amperes
BIL.....110

2.6.6.2 Standard Devices and Accessories

One set of special tools, as necessary for servicing, shall be provided.

2.6.6.3 Stick (Hook) Operated Line Switches

Stick (hook) operated line switches shall comply with ANSI C37.32 and shall be a stick-operated, single-pole, single-throw, vertical-break switch suitable for vertical mounting.

2.7 INSTRUMENT TRANSFORMERS

2.7.1 General

Instrument transformers for the existing wattmeter are existing and are attached and wired on the existing voltage regulator steel frame, that is to be relocated to the new substation structure. Instrument transformers for the new reclosers are internal in the reclosers.

2.8 AUXILIARY SUBSTATION EQUIPMENT

2.8.1 Miscellaneous

Standard accessories and components in accordance with IEEE C57.15 shall be provided.

2.9 CABINETS AND ENCLOSURES

Cabinets and enclosures shall comply with NEMA 250 and shall be of galvanized steel, shall be provided with hinged doors, and shall be suitable for outdoor installation. Thickness of metal and outdoor construction shall be in accordance with UL 50.

2.10 MISCELLANEOUS

2.10.1 Low-Voltage Power Circuit Breakers

a. Construction:

Low-voltage power circuit breakers shall conform to IEEE C37.13, ANSI C37.16, and NEMA SG 3 and shall be three-pole, single-throw, stored energy, manually operated, with drawout mounting. Solid-state trip elements which require no external power connections shall be provided. Circuit breakers shall have an open/close contact position indicator, charged/discharged stored energy indicator, primary disconnect devices, and a mechanical interlock to prevent making or breaking contact of the primary disconnects when the circuit breaker is closed. The circuit breaker enclosure shall be

suitable for its intended location.

b. Ratings:

Voltage ratings shall be not less than the applicable circuit voltage. Circuit breakers shall be rated for 100 percent continuous duty and shall have trip current ratings and frame sizes as shown. Nominal voltage ratings, maximum continuous-current ratings, and maximum short-circuit interrupting ratings shall be in accordance with ANSI C37.16. Tripping features shall be as follows:

1. Long-time current pick-up, adjustable from 50 percent to 100 percent of sensor current rating.
2. Adjustable long-time delay.
3. Short-time current pick-up, adjustable from 1.5 to 9 times long-time current setting.
4. Adjustable short-time delay.
5. Instantaneous current pick-up, adjustable from 1.5 to 9 times long-time current setting.
6. Ground-fault pick-up, adjustable from 20 percent to 60 percent of sensor rating, but in no case greater than 1200 amperes. Sensing of ground-fault current at the main bonding jumper or ground strap shall not be permitted. Zone-selective interlocking shall be provided as shown.
7. Fixed ground-fault delay.

2.10.2 Wiring

Wiring between separate items of station equipment shall conform to the requirements of Section 16370 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL. The minimum class of stranding shall be Class C. Class K stranding shall be used for wiring between items of equipment mounted on swinging panels or doors and items mounted on fixed panels or parts of fixed assemblies. The insulation type shall be the type SIS unless otherwise specified, indicated, or proposed and approved for use. The minimum wire gauge shall be No. 14 AWG, except No. 18 AWG may be used for circuits that use one ampere or less. Circuits rated less than 115 volts ac or 125 volts dc may be wired with wiring rated 300 volts-to-ground. Otherwise, all wiring shall be rated for 600 volts ac and 250 volts dc. Current transformer circuit wiring shall be not less than No. 10 AWG. Wiring for Close and Trip circuits shall be not less than No. 8 AWG. Wire markers shall be affixed to each end of wires and shall contain wire number or designations shown on contract or detail drawings, or as otherwise approved. Wire numbers shall also be permanently marked on terminal block marking strips where wires are connected. Only insulated-barrel, crimp-type, ring lugs shall be used.

2.10.3 Single-Line Electrical Diagram

A single-line electrical diagram of the station shall be provided. The diagram shall be enclosed between matte-surface thermoplastic sheets buttoned or otherwise suitably fastened together to allow easy access to the diagram for making any future changes. The diagram shall be suitable

for outdoor mounting and shall be approximately 14 x 21 inches unless another size is approved. The diagram shall be attached with temperature- and moisture-resistant, pressure-sensitive adhesive or with other suitable means to the indicated location at the metal-clad switchgear lineup, except when otherwise shown or directed.

2.10.4 Liquid Dielectrics

Liquid dielectrics for transformers and other liquid-filled electrical equipment shall be non-polychlorinated biphenyl (PCB) mineral-oil or less-flammable liquid as specified. Nonflammable fluids shall not be used. Tetrachloroethylene (perchloroethylene) and 1, 2, 4 Trichlorobenzene (TCB) fluid shall not be used. Liquid dielectrics in retrofitted equipment shall be certified by the manufacturer as having less than 50 parts-per-million (ppm) PCB content. In lieu of the manufacturer's certification, the Contractor may submit a test sample of the dielectric in accordance with ASTM D 923 and have tests performed per ASTM D 4059 at a testing facility approved by the Contracting Officer. Equipment with test results indicating PCB level exceeding 50 ppm shall be replaced.

2.10.5 Danger Signs

One danger sign inscribed "DANGER-HIGH VOLTAGE" shall be permanently and securely mounted approximately 5 feet above finished grade on each outward side of the fence enclosure. Fasteners shall be of stainless steel. Signs shall be of metal and shall have letters of at least 3 inches in height. Voltage warning signs shall comply with IEEE C2.

2.10.6 Concentric-Lay-Stranded Conductors

Copper conductors shall comply with ASTM B 8 for soft drawn copper. Equivalent aluminum conductors shall comply with ASTM B 231/B 231M.

2.10.7 Conduits, Rigid Metal

Conduits shall comply with UL 6.

2.10.8 Hardware

Ferrous metal threaded items shall comply with ASTM A 153/A 153M and miscellaneous nonthreaded items shall comply with ASTM A 123/A 123M. Other equivalent protective treatment, as required by ASTM A 123/A 123M or ASTM A 153/A 153M, or ferrous metals designed to meet ASTM Standards covering corrosion-resisting steel, will be permitted if approved in writing.

2.10.9 Padlocks

ASTM F 883.

2.10.10 Panelboards, Circuit-Breaker Type

Panelboards shall comply with NEMA PB 1, UL 50 and UL 67.

2.11 GROUNDING AND BONDING

2.11.1 Driven Ground Rods

Ground rods shall be copper-clad steel conforming to UL 467 not less than 5/8 inch in diameter by 10 feet in length.

2.11.2 Grounding Conductors

Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as the phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

2.12 SURGE ARRESTERS

Surge arresters shall comply with NEMA LA 1, IEEE C62.1, IEEE C62.2, and IEEE C62.11, and shall be provided as indicated. Arresters shall be station class, rated as shown. Arresters shall be equipped with mounting brackets for the indicated installations. Arresters shall be of the metal-oxide varistor type suitable for outdoor installations.

2.13 COORDINATED POWER SYSTEM PROTECTION

Analyses shall be prepared to demonstrate that the equipment selected and system constructed meet the contract requirements for equipment ratings, coordination, and protection. They shall include a load flow analysis, a fault current analysis, and a protective device coordination study. The studies shall be performed by a registered professional engineer with demonstrated experience in power system coordination in the last three years. The Contractor shall provide a list of references complete with points of contact, addresses, and telephone numbers. The selection of the engineer is subject to the approval of the Contracting Officer.

2.13.1 Scope of Analyses

The fault current analysis, and protective device coordination study shall begin at: the nearest upstream device in the existing source system and extend through the downstream devices at the load end.

2.13.2 Determination of Facts

The time-current characteristics, features, and nameplate data for each existing protective device shall be determined and documented. The Contractor shall coordinate with the commercial power company for fault current availability at the site.

2.13.3 Single Line Diagram

A single line diagram shall be prepared to show the electrical system buses, devices, transformation points, and all sources of fault current (including generator and motor contributions). A fault-impedance diagram or a computer analysis diagram may be provided. Each bus, device, or transformation point shall have a unique identifier. If a fault-impedance diagram is provided, impedance data shall be shown. Locations of switches, breakers, and circuit interrupting devices shall be shown on the diagram together with available fault data, and the device interrupting rating.

2.13.4 Fault Current Analysis

2.13.4.1 Method

The fault current analysis shall be performed in accordance with methods described in IEEE Std 242, and IEEE Std 399.

2.13.4.2 Data

Actual data shall be utilized in fault calculations. Bus characteristics and transformer impedances shall be those proposed. Data shall be documented in the report.

2.13.4.3 Fault Current Availability

Balanced three-phase fault, bolted line-to-line, and line-to-ground fault current values shall be provided at each voltage transformation point and at each power distribution bus. The maximum and minimum values of fault available at each location shall be shown in tabular form on the diagram or in the report.

2.13.5 Coordination Study

The study shall demonstrate that the maximum possible degree of selectivity has been obtained between devices specified, consistent with protection of equipment and conductors from damage from overloads and fault conditions. The study shall include a description of the coordination of the protective devices in this project. Provide a written narrative that describes: which devices may operate in the event of a fault at each bus; the logic used to arrive at device ratings and settings; situations where system coordination is not achievable due to device limitations (an analysis of any device curves which overlap); coordination between upstream and downstream devices; and relay settings. Recommendations to improve or enhance system reliability, and detail where such changes would involve additions or modifications to the contract and cost changes (addition or reduction) shall be provided. Composite coordination plots shall be provided on log-log graph paper.

2.14.6 Study Report

- a. The report shall include a narrative describing: the analyses performed; the bases and methods used; and the desired method of coordinated protection of the power system.
- b. The study shall include descriptive and technical data for existing devices and new protective devices proposed. The data shall include manufacturers published data, nameplate data, and definition of the fixed or adjustable features of the existing or new protective devices.
- c. The report shall document utility company data including system voltages, fault MVA, system X/R ratio, time-current characteristic curves, current transformer ratios, and relay device numbers and settings; and existing power system data including time-current characteristic curves and protective device ratings and settings.
- d. The report shall contain fully coordinated composite time-current characteristic curves for each bus in the system, as required to ensure coordinated power system protection between protective devices or equipment. The report shall include recommended ratings and settings of all protective devices in tabulated form.
- e. The report shall provide the calculations performed for the analyses, including computer analysis programs utilized. The name of the software package, developer, and version number shall be

provided.

2.14 FACTORY TESTS

Factory tests shall be performed, as follows, in accordance with the applicable publications and with other requirements of these specifications. The Contracting Officer shall be notified at least 10 days before the equipment is ready for testing. The Contracting Officer reserves the right to witness the tests.

- a. High-Voltage Circuit Breakers: Manufacturer's standard tests in accordance with IEEE C37.09 and IEEE C37.081.
- b. High-Voltage Air Switches: Manufacturer's standard tests in accordance with IEEE C37.34 and IEEE C37.41.
- c. Protective Relays: Seismic tests in accordance with IEEE C37.98. Surge withstand tests in accordance with IEEE C37.90.1.
- d. Relaying Current Transformers: Manufacturer's standard tests in accordance with IEEE C57.13.
- e. Instrument Current Transformers: Manufacturer's standard tests in accordance with IEEE C57.13.
- f. Voltage Regulators: Manufacturer's standard tests in accordance with IEEE C57.15.
- g. High-Voltage Fuses: Manufacturer's standard tests in accordance with IEEE C37.41.
- k. Neutral Grounding Resistor: Manufacturer's standard tests in accordance with IEEE Std 32.
- l. Electrical Power Insulators: Manufacturer's standard tests in accordance with ANSI C29.1.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions. Circuits installed in conduits or underground and splices and terminations for medium-voltage cable shall conform to the requirements of Section 16370 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL.

3.1.1 Conformance to Codes

The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2.

3.1.2 Verification of Dimensions

The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall notify the Contracting Officer of any discrepancy before performing any work.

3.1.3 Fencing

The station shall be enclosed by chain-link fence as shown. Fencing is specified in Section 02821 CHAIN-LINK FENCE and shall be grounded in accordance with paragraph GROUNDING.

3.1.4 Surface Treatment

Horizontal spaces between concrete foundations or pads and fences shall be excavated to minimum depth of twelve inches below finished gradelines, shall be graded to level surfaces, and filled with well-compacted clean coarse gravel or crushed stone of 1/2 to 1-1/2 inches in size up to finished gradelines.

3.1.5 Spare Accessory Storage

A cabinet shall be provided for storage of equipment accessories as necessary, including spare fuses, fuse tongs, switch sticks, and other tools and located where indicated. Shelves or other appropriate supporting methods shall provide an individual space for each type of item stored.

3.1.6 Fire Extinguisher Storage

An outdoor cabinet for housing a Government-provided, hand-operated, self-expellent, carbon dioxide fire extinguisher of 10 to 15 pounds capacity for Class C fires shall be provided and located as approved. The cabinet shall have a glass cover door and be painted red.

3.1.7 Connections to Utility Lines

The Contractor shall coordinate the work with the Contracting Officer. The utility company shall provide final line connections to the new substation. The work by the utility company will include their setting a new pole, for better access to tie into the new substation.

3.2 EQUIPMENT INSTALLATION

3.2.1 Transformer Stations

Transformer stations shall be installed in accordance with IEEE C57.93 and shall be fence-enclosed type and mounted on steel framework.

3.2.2 Transformer Installation

Transformers shall be carefully installed so as not to scratch finishes or damage bushings. Transformers shall be installed in accordance with the manufacturer's instructions. After installation, surfaces shall be inspected and scratches shall be touched up with a finish provided by the transformer manufacturer for this purpose.

3.2.3 Equipment Finishes

Equipment shall be carefully installed so as not to scratch finishes. After installation, finished surfaces shall be inspected and scratches touched up with a finish provided by the manufacturer especially for this purpose.

3.2.4 Supports

Enclosures and enclosure supports shall be installed in accordance with

manufacturer's instructions. Supports shall consist of anchored channels leveled and then embedded in the concrete foundation. Channels, anchors, shims, or other leveling items shall be installed in accordance with the recommendations of the equipment manufacturer.

3.2.5 Incoming Line Surge Arresters

Surge arresters of the station intermediate type shall be provided on each phase of each incoming line circuit, and mounted on station structures as shown.

3.2.6 Transformer Surge Arresters

Surge arresters of the station type, suitable for a grounded system and for the associated transformer primary line-to-ground voltage, shall be mounted next to each high-voltage bushing on a transformer tank-mounted bracket and connected to a surge arrester ground pad. Discharge counters shall be provided and mounted on the brackets.

3.3 ELECTRICAL BUS CONNECTIONS

All connections to aluminum bus shall be cleaned and coated with an inhibitor in accordance with manufacturer's recommended methods. All bolted connections shall be torqued to the correct tightness. The Contractor shall establish a checklist to insure that bolted connections have been properly coated and correctly torqued.

3.4 GROUNDING

A grounding grid, consisting of the indicated configuration of bare copper conductors and driven ground rods shall be installed as shown on the drawings. Grounding grid shall comply with IEEE Std 80. Equipment frames of metal-enclosed equipment, medium-voltage cable terminations, chain-link fencing, metal-structures, and other noncurrent-carrying metal items shall be connected to the ground grid as shown. At least two connections shall be provided from the power transformer and voltage regulators and one from each recloser to the ground grid. Fences shall be grounded at each fixed gate post, each corner post, and at intermediate posts as indicated. Each gate section shall be bonded to its gate posts with a 1/8 x 1 inch flexible braided copper strap and ground post clamps. Fence ground clamps shall be of a type that inhibits corrosion between metal parts. Outriggers shall be grounded as shown.

3.4.1 Grounding Electrodes

Grounding electrodes shall be as follows:

- a. Driven rod electrodes - Unless otherwise indicated, ground rods shall be driven into the earth until the tops of the rods are approximately eighteen inches below finished grade.
- b. Grid grounding electrodes - A grid grounding electrode shall be installed as shown consisting of bare copper conductors installed 18 inches, plus 3 inches/minus 1 inch, below the finished top of soil grade. Grid conductors shall be bonded to all rod electrodes, and to all other intersecting grid conductors. Grid conductors shall be sized as shown.

3.4.2 Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process or with bolted solderless bronze connectors, in compliance with UL 467, and those below grade shall be made by the fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3.4.3 Grounding and Bonding Conductors

Grounding and bonding conductors include all conductors used to bond transformer enclosures, equipment frames and structural members to the grounding grid. Grounding and bonding conductors shall be sized as shown. After being located to provide maximum physical protection, exposed grounding conductors shall be securely attached to structural supports at not more than two foot intervals with suitable fasteners. Bends greater than 45 degrees in ground conductors are not permitted. Routing of ground conductors through concrete should be avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor, and the opening shall be sealed with a suitable compound after installation.

3.4.4 Surge Arrester Grounding

Surge arresters and neutrals shall be bonded directly to the transformer enclosure and then to the grounding grid with a bare copper conductor, minimum size 4/0. Lead lengths shall be kept as short as practicable with no kinks or sharp bends.

3.5 FIELD TESTING

3.5.1 General

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 30 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. All field test reports will be signed and dated by the Contractor.

3.5.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.5.3 Ground-Resistance Tests

The resistance of each grounding electrode and the grounding grid shall be measured using the fall-of-potential method defined in IEEE Std 81. Soil resistivity in the area of the grid shall be measured concurrently with the grid measurements. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally

dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

- a. Single rod electrode - 25 ohms.
- b. Grid electrode - 1 ohm.

3.5.4 Ground-Grid Connection Inspection

All below-grade ground-grid connections will be visually inspected by the Contracting Officer before backfilling. The Contractor shall notify the Contracting Officer 48 hours before the site is ready for inspection.

3.5.5 Liquid-Filled Transformer Tests

The following field tests shall be performed on all liquid-filled transformers.

- a. Insulation resistance test phase-to-ground.
- b. Turns ratio test.
- c. Correct phase sequence.
- d. Correct operation of tap changer.

3.5.6 Existing Voltage Regulators Tests

The following field tests shall be performed on the three existing voltage regulators.

- a. Insulation resistance test phase-to-ground.
- b. Perform required periodic maintenance, e.g. test oil, bushings, etc.

3.5.7 Circuit Interrupter Switchgear Tests

The following field tests shall be performed on circuit interrupters.

- a. Insulation resistance test phase-to-phase.
- b. Insulation resistance test phase-to-ground.
- c. Closed contact resistance test.
- d. Power factor test.
- e. High-potential test.
- f. SF6 dielectric test for SF6 interrupters in accordance with ASTM D 2472.
- g. Manual and electrical operation of the switchgear.

3.5.8 Protective Relays

Protective relays shall be visually and mechanically inspected, adjusted, tested, and calibrated in accordance with the manufacturer's published instructions. Tests shall include pick-up, timing, contact action, restraint, and other aspects necessary to insure proper calibration and operation. Relay settings shall be implemented in accordance with the coordination study. Relay contacts shall be manually or electrically operated to verify that the proper breakers and alarms initiate. Relaying current transformers shall be field tested in accordance with IEEE C57.13.

3.5.9 Pre-Energization Services

Calibration, testing, adjustment, and placing into service of the installation shall be accomplished by a manufacturer's product field service engineer or independent testing company with a minimum of two years of current product experience. No part of the electrical system shall be energized until all station grounding components have been tested and demonstrated to comply with the specified requirements. The following services shall be performed on the equipment listed below. These services shall be performed subsequent to testing but prior to the initial energization. The equipment shall be inspected to insure that installation is in compliance with the recommendations of the manufacturer and as shown on the detail drawings. Terminations of conductors at station buses and at major equipment shall be inspected to ensure the adequacy of connections. Bare and insulated conductors between such terminations shall be inspected to detect possible damage caused during installation. If factory tests were not performed on completed assemblies, tests shall be performed after the installation of completed assemblies. Components shall be inspected for damage during installation or shipment and to verify that packaging materials have been removed. Components capable of being both manually and electrically operated shall be operated manually prior to the first electrical operation. Components capable of being calibrated, adjusted, and tested shall be calibrated, adjusted, and tested in accordance with the instructions of the equipment manufacturer. Items for which such services shall be provided include, but are not limited to, are the following:

Battery, station.

Breakers, circuit.

Buses, station aerial.

Regulator, step-voltage.

Switches, disconnect with or without power fuses.

Switches, air-break.

Transformers, substation.

3.5.10 Operating Tests

After the installation is completed, and at such time as the Contracting Officer may direct, the Contractor shall conduct operating tests for approval. The equipment shall be demonstrated to operate in accordance with the requirements herein. An operating test report shall be submitted in accordance with paragraph TEST REPORTS.

3.6 MANUFACTURER'S FIELD SERVICE

3.6.1 Onsite Training

The Contractor shall conduct a training course for the operating staff as designated by the Contracting Officer. The training period shall consist of a total of 8 hours of normal working time and shall start after the system is functionally completed but prior to final acceptance tests. The course instruction shall cover pertinent points involved in operating, starting, stopping, servicing the equipment, along with safety instructions required for each procedure, as well as all major elements of the operation and maintenance manuals. Additionally, the course instructions shall demonstrate all routine maintenance operations. A VHS format video tape of the entire training session shall be submitted.

3.6.2 Installation of Equipment

After delivery of the equipment, the Contractor shall furnish one or more equipment Manufacturer's Representatives to assist in the performance of the onsite tests and initial operation.

3.7 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation material or operation have been corrected.

3.8 FUSES AND SWITCHES, MEDIUM-VOLTAGE

-- End of Section --

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SECTION 16370

ELECTRICAL DISTRIBUTION SYSTEM, AERIAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C29.1	(1988; R 2002) Test Methods for Electrical Power Insulators
ANSI C29.2	(1992; R 1999) Insulators - Wet-Process Porcelain and Toughened Glass - Suspension Type
ANSI C29.3	(1986; R 2002) Wet Process Porcelain Insulators - Spool Type
ANSI C29.5	(1984; R 2002) Wet-Process Porcelain Insulators - Low- and Medium-Voltage Types
ANSI C29.6	(1996; R 2002) Wet-Process Porcelain Insulators - High-Voltage Pin Type
ANSI C29.8	(1985; R 2002) Apparatus, Cap and Pin Type Wet-Process Porcelain Insulators -
ANSI C29.9	(1983; R 2002) Wet-Process Porcelain Insulators - Apparatus, Post-Type
ANSI C135.1	(1979) Galvanized Steel Bolts and Nuts for Overhead Line Construction
ANSI C135.2	(1999) Threaded Zinc-Coated Ferrous Strand-Eye Anchor Rods and Nuts for Overhead Line Construction
ANSI C135.4	(1987) Zinc-Coated Ferrous Eyebolts and Nuts for Overhead Line Construction
ANSI C135.14	(1979) Staples with Rolled or Slash Points for Overhead Line Construction
ANSI C135.22	(1988) Galvanized Ferrous Pole-Top Insulator Pins with Lead Threads for Overhead Line Construction

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC CS6 (1996) Ethylene Propylene Rubber Insulated
Shielded Power Cables Rated 69 kV

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2002) Zinc (Hot-Dip Galvanized) Coatings
on Iron and Steel Products

ASTM A 153/A 153M (2001a) Zinc Coating (Hot-Dip) on Iron and
Steel Hardware

ASTM A 575 (1996; R 2002) Steel Bars, Carbon,
Merchant Quality, M-Grades

ASTM A 576 (1990b; R 2000) Steel Bars, Carbon,
Hot-Wrought, Special Quality

ASTM B 1 (2001) Hard-Drawn Copper Wire

ASTM B 8 (1999) Concentric-Lay-Stranded Copper
Conductors, Hard, Medium-Hard, or Soft

ASTM B 117 (1997) Operating Salt Spray (Fog) Apparatus

ASTM D 1654 (1992; R 2000) Evaluation of Painted or
Coated Specimens Subjected to Corrosive
Environments

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C25 (2001) Sawn Crossarms - Preservative
Treatment by Pressure Processes

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2002) National Electrical Safety Code

IEEE C57.19.00 (1991; R 1997) Standard General
Requirements and Test Procedures for
Outdoor Power Apparatus Bushings

IEEE C57.19.01 (2000) Performance Characteristics and
Dimensions for Outdoor Apparatus Bushings

IEEE Std 81 (1983) Guide for Measuring Earth
Resistivity, Ground Impedance, and Earth
Surface Potentials of a Ground System
(Part 1) Normal Measurements

IEEE Std 100 (2000) IEEE Standard Dictionary of
Electrical and Electronics Terms

IEEE Std 404 (2000) Cable Joints for Use with Extruded
Dielectric Cable Rated 5000 V Through 138
000 V and Cable Joints for Use with
Laminated Dielectric Cable Rated 2500 V

Through 500 000 V

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA HV 2	(1991; R 1996; R 2002) Application Guide for Ceramic Suspension Insulators
NEMA WC 8	(1988; Rev 3 1996) Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
NEMA WC 74	(2000) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
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U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS 1728H-701	(1993) Wood Crossarms Transmission Timbers and Pole Keys
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UNDERWRITERS LABORATORIES (UL)

UL 467	(1993; Rev thru Feb 2001) Grounding and Bonding Equipment
UL 486A	(1997; Rev thru May 2001) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486B	(1997; Rev thru May 2001) Wire Connectors for Use with Aluminum Conductors

1.2 GENERAL REQUIREMENTS

1.2.1 Terminology

Terminology used in this specification is as defined in IEEE Std 100.

1.2.2 Service Conditions

Items provided under this section shall be specifically suitable for the following service conditions.

- c. Ambient Temperature -40 to 100 degrees F.
- d. Frequency 60 Hz

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Electrical Distribution System; G, DO

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams and other information necessary to define the installation and enable the Government to check conformity with the requirements of the contract drawings. Detail drawings shall as a minimum include:

- a. Crossarms.
- b. Conductors.
- c. Insulators.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures shall be submitted with the detail drawings. Approved departures shall be made at no additional cost to the Government.

Detail drawings shall show how components are assembled, function together and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the same equipment or system are not acceptable except where prior approval has been obtained from the Contracting Officer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall consist of the following:

- a. Detail drawings showing physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. Optional items shall be clearly identified as included or excluded.

As-Built Drawings; G, DO

The as-built drawings shall be a record of the construction as installed. The drawings shall include the information shown on the contract drawings as well as deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full sized set of prints marked to reflect deviations, modifications, and changes. The as-built drawings shall be complete and show the location, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or

omissions, they will be returned to the Contractor for correction.

The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor.

SD-03 Product Data

Material and Equipment; G, DO

A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include the item number, the quantity of items proposed, and the name of the manufacturer of the item.

General Installation Requirements; G, DO

As a minimum, installation procedures for regulators, transformers and reclosers. Procedures shall include diagrams, instructions, and precautions required to install, adjust, calibrate, and test the devices and equipment.

SD-06 Test Reports

Factory Tests

Certified factory test reports shall be submitted when the manufacturer performs routine factory tests, including tests required by standards listed in paragraph REFERENCES. Results of factory tests performed shall be certified by the manufacturer, or an approved testing laboratory, and submitted within 7 days following successful completion of the tests specified in applicable publications or in these specifications.

Field Testing

A proposed field test plan 30 days prior to testing the installed system. No field test shall be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

SD-07 Certificates

Material and Equipment

Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), the Contractor shall submit proof that the items provided under this section of the specifications conform to such requirements. The label of, or listing by, UL will be acceptable as evidence that the items conform thereto. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable as evidence that the item conforms thereto. A similar certification or published catalog specification data statement to

the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable as evidence that the item conforms thereto. In lieu of such certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have been tested and that they conform to the requirements listed, including methods of testing of the specified agencies.

1.4 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Switches shall be stored in accordance with the manufacturer's requirements.

1.5 EXTRA MATERIALS

Two complete sets of all special tools required for maintenance shall be provided, complete with a suitable tool box. Special tools are those that only the manufacturer provides, for special purposes (to access compartments, or operate, adjust, or maintain special parts).

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Products shall conform to the following requirements. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.2 STANDARD PRODUCT

Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.3 CORROSION PROTECTION

2.3.1 Aluminum Materials

Aluminum shall not be used.

2.3.2 Ferrous Metal Materials

2.3.2.1 Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M.

2.3.2.2 Equipment

Equipment and component items, including but not limited to transformers and ferrous metal luminaires not hot-dip galvanized or porcelain enamel finished, shall be provided with corrosion-resistant finishes which shall withstand 120 hours of exposure to the salt spray test specified in ASTM B 117 without loss of paint or release of adhesion of the paint primer coat

to the metal surface in excess of 1/16 inch from the test mark. The described test mark and test evaluation shall be in accordance with ASTM D 1654 with a rating of not less than 7 in accordance with TABLE 1, (procedure A). Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard.

2.3.3 Finishing

Painting required for surfaces not otherwise specified and finish painting of items only primed at the factory shall be as specified in Section 09900 PAINTS AND COATINGS.

2.4 CONDUCTORS, CONNECTORS, AND SPLICES

2.4.1 Copper Conductors

Hard-drawn-copper conductors shall comply with ASTM B 1 and ASTM B 8 as appropriate for the conductor size.

2.4.2 Connectors and Splices

Connectors and splices shall be of copper alloys for copper conductors and a type designed to minimize galvanic corrosion for copper to aluminum-composition conductors. Aluminum-composition to copper shall comply with UL 486B, and copper-to-copper shall comply with UL 486A.

2.5 MEDIUM-VOLTAGE LINES

2.5.1 Bare Medium-Voltage Lines

Bare medium-voltage line conductors shall be hard-drawn-copper, CU. Conductor types shall not be mixed on any project, unless specifically indicated. Conductors larger than No. 2 AWG shall be stranded.

2.5.2 Insulated Medium-Voltage Lines

Insulated medium-voltage line conductors shall be of the factory-assembled, messenger-supported type, having a rated circuit voltage of 5kV, and a 133 percent insulation level. Conductor material shall be CU. Insulation shall be ethylene-propylene-rubber (EPR) conforming to NEMA WC 8 and AEIC CS6. Messengers shall be zinc-coated steel, aluminum-clad-steel, copper-clad-steel, or composite-copper and copper-clad steel.

2.6 LOW-VOLTAGE LINES

Low-voltage line conductors shall be of the neutral-supported secondary and service drop type with cross-linked thermosetting polyethylene (XLP) insulation in accordance with NEMA WC 8. Neutral-supported secondary and service drop conductors shall be insulated copper with bare hard-drawn-copper or copper-clad steel neutrals. Conductors on secondary racks may be provided in lieu of neutral-supported cable for pole line circuits where necessary clearances are available.

2.7 POLES AND HARDWARE

2.7.1 Pole Line Hardware

Zinc-coated hardware shall comply with ANSI C135.1, ANSI C135.2, ANSI C135.4,

ANSI C135.14 ANSI C135.22. Steel hardware shall comply with ASTM A 575 and ASTM A 576. Hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M. Pole-line hardware shall be hot-dip galvanized steel. Washers shall be installed under boltheads and nuts on wood surfaces and elsewhere as required. Washers used on through-bolts and double-arming bolts shall be approximately 2-1/4 inches square and 3/16 inch thick. The diameter of holes in washers shall be the correct standard size for the bolt on which a washer is used. Washers for use under heads of carriage-bolts shall be of the proper size to fit over square shanks of bolts. Eye bolts, bolt eyes, eyenuts, strain-load plates, lag screws, guy clamps, fasteners, hooks, shims, and clevises shall be used wherever required to support and to protect poles, brackets, crossarms, guy wires, and insulators.

2.8 INSULATORS

Insulators shall comply with NEMA HV 2 for general requirements. Suspension insulators shall be used at corners, angles, dead-ends, other areas where line insulators do not provide adequate strength, and as indicated. Mechanical strength of suspension insulators and hardware shall exceed the rated breaking strength of the attached conductors.

2.8.1 Medium-Voltage Line Insulators

Medium-voltage line insulators shall comply with ANSI C29.2, ANSI C29.5, and ANSI C29.6, and as applicable. Ratings shall not be lower than the ANSI classes indicated in TABLE I. Horizontal line-post insulators shall be used for armless construction and shall have the same mechanical and electrical ratings as vertical line-post insulators for the ANSI class indicated, but shall be modified to be suitable for horizontal installation. Where line-post insulators are used for angles greater than 15 degrees, clamp-top fittings shall be provided as well as for other locations shown. Conductor clamps for use with clamp-top, line-post insulators shall be hot-dip galvanized malleable iron for copper conductors and aluminum alloy for aluminum-composition conductors. Either line-post or pin insulators may be used for crossarm construction. Pin insulators for use on voltages in excess of 6 kV phase-to-phase shall be radio-interference-freed or else line-post insulators shall be used.

TABLE I

MINIMUM ANSI RATING OF MEDIUM-VOLTAGE INSULATORS BY CLASS

Voltage Level	Line-Post	Pin	Suspension
6 kV to 15 kV	57-1 or 11	55-5	Two 52-2
	57-2 or 12	56-3	Two 52-3 or 4
26 kV to 35 kV	57-3 or 13	56-4	Three 52-3 or 4
	57-4 or 14	56-5	Four 52-3 or 4

2.8.2 Low-Voltage Line Insulators

Low-voltage line insulators shall comply with ANSI C29.2 and ANSI C29.3 as applicable. Spool insulators for use on low-voltage lines shall be mounted on clevis attachments or secondary racks and shall be not smaller than Class 53-3. For No. 4/0 AWG and larger conductors, Class 53-5 shall be used. Suspension insulators on clevis attachments used at dead-ends shall be not smaller than Class 52-1.

2.8.3 Apparatus Insulators

Apparatus insulators shall comply with IEEE C57.19.00, IEEE C57.19.01, ANSI C29.8, and ANSI C29.9 as applicable.

2.9 CROSSARM ASSEMBLIES

2.9.1 Crossarms

Crossarms shall comply with RUS 1728H-701 and shall be solid wood, distribution type, except cross-sectional area with pressure treatment conforming to AWPAC 25, and a 1/4 inch, 45 degree chamfer on all top edges. Cross-sectional area minimum dimensions shall be 4-1/4 inches in height by 3-1/4 inches in depth in accordance with IEEE C2 for Grade B construction. Crossarms shall be 8 feet in length. Crossarms shall be machined, chamfered, trimmed, and bored for stud and bolt holes before pressure treatment. Factory drilling shall be provided for pole and brace mounting, for four pin or four vertical line-post insulators, and for four suspension insulators, except where otherwise indicated or required. Drilling shall provide required climbing space and wire clearances. Crossarms shall be straight and free of twists to within 1/10 inch per foot of length. Bend or twist shall be in one direction only. Furnish crossarm support gain, as shown on the drawings.

2.10 GROUNDING AND BONDING

2.10.1 Driven Ground Rods

Ground rods shall be of copper-clad steel conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length of the sectional type driven full length into the earth.

2.10.2 Grounding Conductors

Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as the phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

2.11 WARNING SIGNS

Warning signs shall be porcelain enameled steel or approved equal. Voltage warning signs shall comply with IEEE C2.

2.12 FACTORY TESTS

Factory tests shall be performed, as follows, in accordance with the applicable publications and with other requirements of these specifications. The Contracting Officer shall be notified at least 10 days before the equipment is ready for testing.

- a. Electric Power Insulators: Manufacturer's standard tests in accordance with ANSI C29.1.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions. Circuits installed in conduits or underground and splices and terminations for medium-voltage cable shall conform to the requirements of Section 16375 ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND.

3.1.1 Conformance to Codes

The installation shall comply with the requirements and recommendations of IEEE C2 for heavy loading districts, Grade B construction. No reduction in clearance shall be made. The installation shall also comply with the applicable parts of NFPA 70.

3.1.2 Verification of Dimensions

The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall notify the Contracting Officer of any discrepancy before performing any work.

3.2 CROSSARM MOUNTING

Crossarms shall be bolted to poles with 5/8 inch through-bolts with square washers at each end. Bolts shall extend not less than 1/8 inch nor more than 2 inches beyond nuts. On single crossarm construction, the bolt head shall be installed on the crossarm side of the pole. Metal crossarm braces shall be provided on crossarms. Flat braces may be provided for 8 foot crossarms and shall be 1/4 by 1-1/4 inches, not less than 28 inches in length. Flat braces shall be bolted to arms with 3/8 inch carriage bolts with round or square washers between boltheads and crossarms, and secured to poles with 1/2 by 4 inch lag screws after crossarms are leveled and aligned. Furnish a cross arm support gain for crossarms installed without existing pole gains, e.g. the new crossarm and the existing surge arrester crossarms.

3.3 CONDUCTOR INSTALLATION

3.3.1 Line Conductors

Unless otherwise indicated, conductors shall be installed in accordance with manufacturer's approved tables of sags and tensions. Proper care shall be taken in handling and stringing conductors to avoid abrasions, sharp bends, cuts, kinks, or any possibility of damage to insulation or conductors. Conductors shall be paid out with the free end of conductors fixed and cable reels portable, except where terrain or obstructions make this method unfeasible. Bend radius for any insulated conductor shall not be less than the applicable NEMA specification recommendation. Conductors shall not be drawn over rough or rocky ground, nor around sharp bends. When installed by machine power, conductors shall be drawn from a mounted reel through stringing sheaves in straight lines clear of obstructions. Initial sag and tension shall be checked by the Contractor, in accordance with the manufacturer's approved sag and tension charts, within an elapsed time after installation as recommended by the manufacturer.

3.3.2 Connectors and Splices

Connectors and splices shall be mechanically and electrically secure under tension and shall be of the nonbolted compression type. The tensile strength of any splice shall be not less than the rated breaking strength of the conductor. Splice materials, sleeves, fittings, and connectors

shall be noncorrosive and shall not adversely affect conductors. Aluminum-composition conductors shall be wire brushed and an oxide inhibitor applied before making a compression connection. Connectors which are factory-filled with an inhibitor are acceptable. Inhibitors and compression tools shall be of types recommended by the connector manufacturer. Primary line apparatus taps shall be by means of hot line clamps attached to compression type bail clamps (stirrups). Low-voltage connectors for copper conductors shall be of the solderless pressure type. Noninsulated connectors shall be smoothly taped to provide a waterproof insulation equivalent to the original insulation, when installed on insulated conductors. On overhead connections of aluminum and copper, the aluminum shall be installed above the copper.

3.3.3 Conductor-To-Insulator Attachments

Conductors shall be attached to insulators by means of clamps, shoes or tie wires, in accordance with the type of insulator. For insulators requiring conductor tie-wire attachments, tie-wire sizes shall be as indicated in TABLE II.

TABLE II

TIE-WIRE REQUIREMENTS

CONDUCTOR Copper (AWG)	TIE WIRE Soft-Drawn Copper (AWG)
6	8
4 and 2	6
1 through 3/0	4
4/0 and larger	2
AAC, AAAC, or ACSR (AWG)	AAAC OR AAC (AWG)
Any size	6 or 4

3.3.4 Medium-Voltage Insulated Cables

Medium-voltage cable messengers shall be attached to poles with clamps providing a strength exceeding the required messenger strength and with not less than 5/8 inch through-bolts. Messengers shall be dead-ended, grounded, and line-guyed at corners and dead-ends.

3.3.5 Low-Voltage Insulated Cables

Low-voltage cables shall be supported on clevis fittings using spool insulators. Dead-end clevis fittings and suspension insulators shall be provided where required for adequate strength. Dead-end construction shall provide a strength exceeding the rated breaking strength of the neutral messenger. Clevis attachments shall be provided with not less than 5/8 inch through-bolts. Secondary racks may be used when installed on wood poles and where the span length does not exceed 200 feet. Secondary racks shall be two-, three-, or four-wire, complete with spool insulators. Racks shall meet strength and deflection requirements for heavy-duty steel racks, and shall be either galvanized steel or aluminum alloy. Tops of insulator saddles shall be rounded and smooth to avoid damage to conductor insulation. Each insulator shall be held in place with a 5/8 inch

button-head bolt equipped with a nonferrous cotter pin, or equivalent, at the bottom. Racks for dead-ending four No. 4/0 AWG or four larger conductors shall be attached to poles with three 5/8 inch through-bolts. Other secondary racks shall be attached to poles with at least two 5/8 inch through-bolts. Minimum vertical spacing between conductors shall not be less than 8 inches.

3.4 CONNECTIONS TO UTILITY LINES

The Contractor shall coordinate the work with the Contracting Officer and shall provide for final connections to the utility electric lines.

3.5 GROUNDING

Noncurrent-carrying metal parts of equipment and conductor assemblies, such as medium-voltage cable terminations and messengers, metal poles, and other noncurrent-carrying metal items shall be grounded. Additional grounding of equipment, and neutral grounding systems shall be installed at poles where indicated.

3.5.1 Grounding Electrodes

Grounding electrodes shall be installed as follows:

- a. Driven rod electrodes - Unless otherwise indicated, ground rods shall be located approximately 3 feet out from base of the pole and shall be driven into the earth until the tops of the rods are approximately 1 foot below finished grade. Multiple rods shall be evenly spaced at least 10 feet apart and connected together 2 feet below grade with a minimum No. 6 bare copper conductor.
- d. Ground Resistance - The maximum resistance of a driven ground rod shall not exceed 25 ohms under normally dry conditions. Whenever the required ground resistance is not met, provide additional electrodes interconnected with grounding conductors to achieve the specified ground resistance. The additional electrodes will be up to three 10 feet rods spaced a minimum of 10 feet apart. In high ground resistance, UL listed chemically charged ground rods may be used. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Contracting Officer shall be notified immediately. Connections below grade shall be fusion welded. Connections above grade shall be fusion welded or shall use UL 467 approved connectors.

3.5.2 Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process or with bolted solderless connectors in compliance with UL 467, and those below grade shall be made by a fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3.5.3 Grounding Electrode Conductors

On multi-grounded circuits, as defined in IEEE C2, provide a single continuous vertical grounding electrode conductor. Neutrals, surge arresters, and equipment grounding conductors shall be bonded to this conductor. For single grounded or ungrounded systems, provide a grounding

conductor for the surge arrester and equipment grounding conductors and a separate grounding conductor for the secondary neutrals. Grounding electrode conductors shall be sized as shown. Secondary system neutral conductors shall be connected directly to the transformer neutral bushings, then connected with a neutral bonding jumper between the transformer neutral bushing and the vertical grounding electrode conductor, as shown. Grounding electrode conductors shall be stapled to wood poles at intervals not exceeding 2 feet. On metal poles, a preformed galvanized steel strap, 5/8 inch wide by 22 gauge minimum by length, secured by a preformed locking method standard with the manufacturer, shall be used to support a grounding electrode conductor installation on the pole and spaced at intervals not exceeding 5 feet with one band not more than 3 inches from each end of the vertical grounding electrode conductor. Bends greater than 45 degrees in grounding electrode conductor are not permitted.

3.6 FIELD TESTING

3.6.1 General

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 10 days prior to conducting tests. The Contractor shall furnish materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results.

Field reports will be signed and dated by the Contractor.

3.6.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.6.3 Ground-Resistance Tests

The resistance of each grounding electrode system shall be measured using the fall-of-potential method defined in IEEE Std 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes shall be provided.

3.6.4 Medium-Voltage Preassembled Cable Test

After installation, prior to connection to an existing system, and before the operating test, the medium-voltage preassembled cable system shall be given a high potential test. Direct-current voltage shall be applied on each phase conductor of the system by connecting conductors at one terminal and connecting grounds or metallic shieldings or sheaths of the cable at the other terminal for each test. Prior to the test, the cables shall be isolated by opening applicable protective devices and disconnecting equipment. The method, voltage, length of time, and other characteristics of the test for initial installation shall be in accordance with NEMA WC 74

for the particular type of cable installed, and shall not exceed the recommendations of IEEE Std 404 for cable joints unless the cable and accessory manufacturers indicate higher voltages are acceptable for testing. Should any cable fail due to a weakness of conductor insulation or due to defects or injuries incidental to the installation or because of improper installation of cable, cable joints, terminations, or other connections, the Contractor shall make necessary repairs or replace cables as directed. Repaired or replaced cables shall be retested.

3.6.5 Low-Voltage Cable Test

For underground secondary or service laterals from overhead lines, the low-voltage cable, complete with splices, shall be tested for insulation resistance after the cables are installed, in their final configuration, ready for connection to the equipment, and prior to energization. The test voltage shall be 500 volts dc, applied for one minute between each conductor and ground and between all possible combinations of conductors in the same trench, duct, or cable, with other conductors in the same trench, duct, or conduit. The minimum value of insulation shall be:

$$R \text{ in megohms} = (\text{rated voltage in kV} + 1) \times 1000 / (\text{length of cable in feet})$$

Each cable failing this test shall be repaired or replaced. The repaired cable shall then be retested until failures have been eliminated.

3.6.6 Sag and Tension Test

The Contracting Officer shall be given prior notice of the time schedule for stringing conductors or cables serving overhead medium-voltage circuits and reserves the right to witness the procedures used for ascertaining that initial stringing sags and tensions are in compliance with requirements for the applicable loading district and cable weight.

3.7 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

-- End of Section --

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DIVISION 16 - ELECTRICAL

SECTION 16375

ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND

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SECTION 16375

ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C80.1 (1994) Rigid Steel Conduit - Zinc Coated

ASTM INTERNATIONAL (ASTM)

ASTM B 3 (2001) Soft or Annealed Copper Wire

ASTM B 8 (1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

ASTM B 496 (2001) Compact Round Concentric-Lay-Stranded Copper Conductors

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC CS5 (1994; CS5a-1995) Cross-Linked Polyethylene Insulated Shielded Power Cables Rated 5 Through 46 kV

AEIC CS6 (1996) Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 69 kV

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2002) National Electrical Safety Code

IEEE Std 48 (1996) Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV

IEEE Std 81 (1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1) Normal Measurements

IEEE Std 100 (2000) IEEE Standard Dictionary of Electrical and Electronics Terms

IEEE Std 386 (1995) Separable Insulated Connector Systems for Power Distribution Systems Above 600V

IEEE Std 404 (2000) Cable Joints for Use with Extruded Dielectric Cable Rated 5000 V Through 138 000 V and Cable Joints for Use with Laminated Dielectric Cable Rated 2500 V Through 500 000 V

IEEE Std 592 (1990) Exposed Semiconducting Shields on High Voltage Cable Joints and Separable Insulated Connectors

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA FB 1 (2001) Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

NEMA WC 7 (1988; Rev 3 1996) Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NEMA WC 8 (1988; Rev 3 1996) Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 6 (2000; Rev thru May 2003) Rigid Metal Conduit

UL 467 (1993; Rev thru Feb 2001) Grounding and Bonding Equipment

UL 514A (1996; Rev thru Nov 2001) Metallic Outlet Boxes

UL 1072 (2001; Rev thru Apr 2003) Medium-Voltage Power Cables

1.2 GENERAL REQUIREMENTS

1.2.1 Terminology

Terminology used in this specification is as defined in IEEE Std 100.

1.2.2 Service Conditions

Items provided under this section shall be specifically suitable for the following service conditions.

c. Ambient Temperature -40 to 100 degrees F

d. Frequency 60 hZ

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Electrical Distribution System; G, DO

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams manufacturers standard installation drawings and other information necessary to define the installation and enable the Government to check conformity with the requirements of the contract drawings.

Detail drawings shall as a minimum depict the installation of the following items:

- a. Medium-voltage cables and accessories including cable installation plan.

SD-03 Product Data

Material and Equipment; G, DO

A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each such item.

General Installation Requirements; G, DO

As a minimum, installation procedures for medium-voltage cable terminations and splices. Procedures shall include cable pulling plans.

SD-06 Test Reports

Field Testing

A proposed field test plan, 30 days prior to testing the installed system. No field test shall be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

SD-07 Certificates

Material and Equipment

Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), the Contractor shall

submit proof that the items provided conform to such requirements.

The label of, or listing by, UL will be acceptable as evidence that the items conform. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable as evidence that the item conforms. A similar certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable as evidence that the item conforms. In lieu of such certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have been tested and that they conform to the requirements listed, including methods of testing of the specified agencies. Compliance with above-named requirements does not relieve the Contractor from compliance with any other requirements of the specifications.

Cable Joints

A certification that contains the names and the qualifications of people recommended to perform the splicing and termination of medium-voltage cables approved for installation under this contract. The certification shall indicate that any person recommended to perform actual splicing and terminations has been adequately trained in the proper techniques and have had at least three recent years of experience in splicing and terminating the same or similar types of cables approved for installation. In addition, any person recommended by the Contractor may be required to perform a practice splice and termination, in the presence of the Contracting Officer, before being approved as a qualified installer of medium-voltage cables. If that additional requirement is imposed, the Contractor shall provide short sections of the approved types of cables along with the approved type of splice and termination kits, and detailed manufacturer's instruction for the proper splicing and termination of the approved cable types.

1.4 DELIVERY, STORAGE, AND HANDLING

Material shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced.

PART 2 PRODUCTS

2.1 STANDARD PRODUCT

Material shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Items of the same classification shall be identical.

2.2 CABLES

Cables shall be single conductor type unless otherwise indicated.

2.2.1 Medium-Voltage Cables

2.2.1.1 General

Cable construction shall be Type MV, conforming to NFPA 70 and UL 1072. Cables shall be manufactured for use in direct burial applications.

2.2.1.2 Ratings

Cables shall be rated for a circuit voltage of 5 kV.

2.2.1.3 Conductor Material

Underground cables shall be soft drawn copper complying with ASTM B 3 and ASTM B 8 for regular concentric and compressed stranding or ASTM B 496 for compact stranding.

2.2.1.4 Insulation

Cable insulation shall be cross-linked thermosetting polyethylene (XLP) insulation conforming to the requirements of NEMA WC 7 and AEIC CS5 or ethylene-propylene-rubber (EPR) insulation conforming to the requirements of NEMA WC 8 and AEIC CS6. A 133 percent insulation level shall be used on 5 kV, 15 kV and 25 kV rated cables. The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

2.2.1.5 Shielding

Cables rated for 2 kV and above shall have a semiconducting conductor shield, a semiconducting insulation shield, and an overall copper wire shield for each phase. The shield wire shall be #2/0 AWG.

2.2.1.6 Neutrals

Neutral conductors shall be copper, employing the same insulation and jacket materials as phase conductors, except that a 600-volt insulation rating is acceptable.

2.2.1.7 Jackets

Cables shall be provided with a polyethylene jacket. Direct buried cables shall be rated for direct burial.

2.3 CABLE JOINTS, TERMINATIONS, AND CONNECTORS

2.3.1 Medium-Voltage Cable Joints

Medium-voltage cable joints shall comply with IEEE Std 404 and IEEE Std 592.

Medium-voltage cable terminations shall comply with IEEE Std 48. Joints shall be the standard products of a manufacturer and shall be either of the factory preformed type or of the kit type containing tapes and other required parts. Joints shall have ratings not less than the ratings of the cables on which they are installed. Splice kits may be of the heat-shrinkable type for voltages up to 15 kV, of the premolded splice and connector type, the conventional taped type, or the resin pressure-filled overcast taped type for voltages up to 35 kV; except that for voltages of 7.5 kV or less a resin pressure-filled type utilizing a plastic-tape mold is acceptable. Joints used in manholes, handholes, vaults and pull boxes

shall be certified by the manufacturer for waterproof, submersible applications.

2.3.2 Medium-Voltage Separable Insulated Connectors

Separable insulated connectors shall comply with IEEE Std 386 and IEEE Std 592 and shall be of suitable construction or standard splice kits shall be used. Separable insulated connectors are acceptable for voltages up to 35 kV. Connectors shall be of the loadbreak type as indicated, of suitable construction for the application and the type of cable connected, and shall include cable shield adaptors. Separable insulated connectors shall not be used as substitutes for conventional permanent splices. External clamping points and test points shall be provided.

2.3.3 Terminations

Terminations shall be in accordance with IEEE Std 48, Class 1 or Class 2; of the molded elastomer, wet-process porcelain, prestretched elastomer, heat-shrinkable elastomer, or taped type. Acceptable elastomers are track-resistant silicone rubber or track-resistant ethylene propylene compounds, such as ethylene propylene rubber or ethylene propylene diene monomer. Separable insulated connectors may be used for apparatus terminations, when such apparatus is provided with suitable bushings. Terminations shall be of the outdoor type, except that where installed inside outdoor equipment housings which are sealed against normal infiltration of moisture and outside air, indoor, Class 2 terminations are acceptable. Class 3 terminations are not acceptable. Terminations, where required, shall be provided with mounting brackets suitable for the intended installation and with grounding provisions for the cable shielding, metallic sheath, and armor.

2.3.3.1 Factory Preformed Type

Molded elastomer, wet-process porcelain, prestretched, and heat-shrinkable terminations shall utilize factory preformed components to the maximum extent practicable rather than tape build-up. Terminations shall have basic impulse levels as required for the system voltage level.

2.3.3.2 Taped Terminations

Taped terminations shall use standard termination kits providing terminal connectors, field-fabricated stress cones, and rain hoods. Terminations shall be at least 12-1/2 inches long from the end of the tapered cable jacket to the start of the terminal connector, or not less than the kit manufacturer's recommendations, whichever is greater.

2.4 CONDUIT AND DUCTS

2.4.1 Metallic Conduit

Rigid galvanized steel conduit shall comply with UL 6 and ANSI C80.1. Metallic conduit fittings and outlets shall comply with UL 514A and NEMA FB 1.

2.4.2 Conduit Sealing Compound

Compounds for sealing dconduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F, shall neither slump at a temperature of 300 degrees F, nor harden materially when exposed to

the air. Compounds shall adhere to clean surfaces of fiber or plastic ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials.

2.5 GROUNDING AND BONDING

2.5.1 Driven Ground Rods

Ground rods shall be copper-clad steel conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length. Sectional type rods may be used.

2.5.2 Grounding Conductors

Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

2.6 FENCING

Fencing shall conform to the requirements of Section 02821 FENCING.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Equipment shall be installed and energized in accordance with the manufacturer's published instructions. Circuits installed aerially shall conform to the requirements of Section 16370 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL.

3.1.1 Conformance to Codes

The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable.

3.1.2 Verification of Dimensions

The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

3.2 CABLE INSTALLATION

The Contractor shall obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature, lubricants, coefficient of friction, conduit cleaning, storage procedures, moisture seals, testing for and purging moisture, etc. The Contractor shall then prepare a checklist of significant requirements which shall be submitted along with the manufacturers instructions in accordance with SUBMITTALS.

3.2.1 Cable Installation Plan and Procedure

Cable shall be installed strictly in accordance with the cable manufacturer's recommendations. Each circuit shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each manhole, handhole, junction box, and each terminal. Each tag shall contain the following information; cable type, conductor size, circuit number, circuit voltage, cable destination and phase identification.

3.2.1.1 Cable Inspection

The cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable in accordance with the cable manufacturer's recommendations.

3.2.1.2 Cable Installation

The Contractor shall provide a cable feeding truck and a cable pulling winch as required. The Contractor shall provide a pulling grip or pulling eye in accordance with cable manufacturer's recommendations. The pulling grip or pulling eye apparatus shall be attached to polypropylene or manilla rope followed by lubricant front end packs and then by power cables. A dynamometer shall be used to monitor pulling tension. Pulling tension shall not exceed cable manufacturer's recommendations. The Contractor shall not allow cables to cross over while cables are being fed into duct. For cable installation in cold weather, cables shall be kept at 50 degrees F temperature for at least 24 hours before installation.

3.2.2 Direct-Burial

Cables shall be buried directly in the earth as indicated. Minimum cover from the top of a cable to finished grade shall be 48 inches.

3.2.2.1 Trenching

Trenches for direct-burial cables shall be excavated to depths required to provide the minimum necessary cable cover. Bottoms of trenches shall be smooth and free of stones and sharp objects. Where bottoms of trenches comprise materials other than sand, a 2 inch layer of sand shall be laid first and compacted to approximate densities of surrounding firm soil.

3.2.2.2 Cable Burial

Cables shall be unreeled along the sides of or in trenches and carefully placed on sand or earth bottoms. Pulling cables into direct-burial trenches from a fixed reel position will not be permitted. Bend radius of any cable shall be not less than 12 times the diameter of the cable. In no case shall cables be left under longitudinal tension. The first 4 inch layer of backfill shall be of sand. Machine compaction shall not be used within 6 inches of the cable.

3.2.2.3 Medium-Voltage Cable Joints

Cable joints in direct-burial cables are not permitted.

3.2.2.4 Cable Markers

Markers shall be located near the ends of cable runs and at changes in direction of cable runs. In addition to markers, a 5 mil, brightly colored plastic tape not less than 3 inches in width and suitably inscribed at not

more than 10 feet on centers, or other approved dig-in warning indication, shall be placed approximately 12 inches below finished grade levels of trenches.

3.3 CABLE JOINTS

Medium-voltage cable joints shall be made by qualified cable splicers only. Qualifications of cable splicers shall be submitted in accordance with paragraph SUBMITTALS. Shields shall be applied as required to continue the shielding system through each entire cable joint. Shields may be integrally molded parts of preformed joints. Shields shall be grounded at each joint or in accordance with manufacturer's recommended practice. Cable joints shall provide insulation and jacket equivalent to that of the associated cable. Armored cable joints shall be enclosed in compound-filled, cast-iron or alloy, splice boxes equipped with stuffing boxes and armor clamps of a suitable type and size for the cable being installed.

3.4 CONNECTIONS BETWEEN AERIAL AND UNDERGROUND SYSTEMS

Connections between aerial and underground systems shall be made as shown. Underground cables shall be extended up poles in conduit to cable terminations. Conduits shall be secured to the poles by 2-hole galvanized steel pipe straps spaced not more than 10 feet apart and with 1 strap not more than 12 inches from any bend or termination. Conduits shall be equipped with bushings to protect cables and minimize water entry. Capnut potheads shall be used to terminate medium-voltage multiple-conductor cable. Cables shall be supported by devices separate from the conduit or guard, near their point of exit from the conduit or guard.

3.5 GROUNDING

3.5.1 Grounding Electrodes

Grounding electrodes shall be installed as shown on the drawings and as follows:

- a. Driven rod electrodes - Unless otherwise indicated, ground rods shall be driven into the earth until the tops of the rods are approximately 1 foot 6 inches below finished grade unless otherwise noted.
- b. Additional electrodes - When the required ground resistance is not met, additional electrodes shall be provided interconnected with grounding conductors to achieve the specified ground resistance. The additional electrodes will be up to three, 10 feet rods spaced a minimum of 10 feet apart. In high ground resistance, UL listed chemically charged ground rods may be used. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Contracting Officer shall be notified immediately.

3.5.2 Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process or with bolted solderless connectors, in compliance with UL 467, and those below grade shall be made by a fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3.5.3 Grounding and Bonding Conductors

Grounding and bonding conductors include conductors used to bond transformer enclosures and equipment frames to the grounding electrode system. Grounding and bonding conductors shall be sized as shown, and located to provide maximum physical protection. Bends greater than 45 degrees in ground conductors are not permitted. Routing of ground conductors through concrete shall be avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor, and the opening shall be sealed with a suitable compound after installation.

3.5.4 Riser Pole Grounding

A single continuous vertical grounding electrode conductor shall be installed on each riser pole and connected directly to the grounding electrodes indicated on the drawings or required by these specifications. All items required to be grounded shall be connected directly to this vertical conductor. The grounding electrode conductor shall be sized as shown.

3.6 FIELD TESTING

3.6.1 General

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 10 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. Field test reports shall be signed and dated by the Contractor.

3.6.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.6.3 Ground-Resistance Tests

The resistance of each grounding electrode shall be measured using the fall-of-potential method defined in IEEE Std 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

- a. Single rod electrode - 25 ohms.

3.6.4 Medium-Voltage Cable Test

After installation and before the connection to an existing system, the medium-voltage cable system shall be given a high potential test. Direct-current voltage shall be applied on each phase conductor of the system by connecting conductors as one terminal and connecting grounds or metallic shieldings or sheaths of the cable as the other terminal for each test. Prior to making the test, the cables shall be isolated by opening applicable protective devices and disconnecting equipment. The test shall be conducted with all splices, connectors, and terminations in place. The method, voltage, length of time, and other characteristics of the test for initial installation shall be in accordance with NEMA WC 7 or NEMA WC 8 for the particular type of cable installed, except that 28 kV and 35 kV insulation test voltages shall be in accordance with either AEIC CS5 or AEIC CS6 as applicable, and shall not exceed the recommendations of IEEE Std 404 for cable joints and IEEE Std 48 for cable terminations unless the cable and accessory manufacturers indicate higher voltages are acceptable for testing. Should any cable fail due to a weakness of conductor insulation or due to defects or injuries incidental to the installation or because of improper installation of cable, cable joints, terminations, or other connections, the Contractor shall make necessary repairs or replace cables as directed. Repaired or replaced cables shall be retested.

-- End of Section --